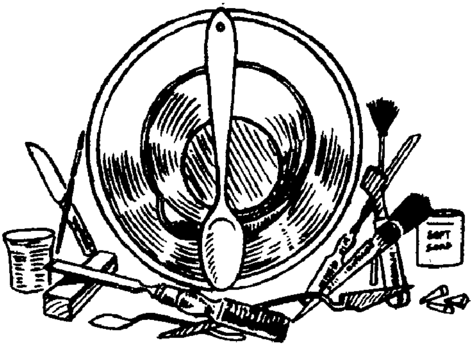
PLASTER CASTING FOR THE STUDENT SCULPTOR

A SCOPAS HANDBOOK

PLASTER CASTING
FOR THE STUDENT SCULPTOR

by

VICTOR H. WAGER



With a Chapter on Papièr Maché by ERIC HART

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PREFACE

THE OBJECT OF THIS BOOK IS TO EXPLAIN, AS SIMPLY AS POSSIBLE, THE COMPLICATED PROCESSES OF MOULDING THE SCULPTOR'S · MODEL INTO PLASTER.

To attain this object, the processes have been described and illustrated step by step, with ample annotations where such are necessary to show up the point at issue.

Everything has been done to make the book easy to follow and strict attention to detail and adherence to the correct order of working as described, will save endless worry and expense. Once the essentials of plaster casting have been absorbed, practice will soon give complete mastery.

Where possible, lessons from the local Art School, or from an experienced Sculptor or Moulder, will be found invaluable.

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Treating the Model.

THROUGHOUT THE BOOK I HAVE ASSUMED THAT THE STUDENT IS CASTING FROM CLAY, PLASTICINE or WAX. (Incidentally remember to allow a clay model to harden slightly before attempting to put plaster on it.) No treatment is necessary for these.

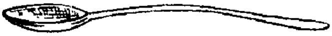
When casting from a plaster cast, it will be found necessary to shellac the model to prevent the mould from adhering.

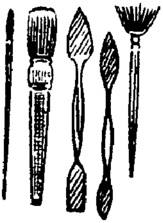
When casting from marble, give a coat of wax to protect its surface. This wax should be prepared from white beeswax and turpentine, brushed on while hot (see page 89). This coating can subsequently be washed off with turpentine.

When casting from unpolished wood, shellac should be used. Methylated spirit will subsequently remove most of it after the casting.

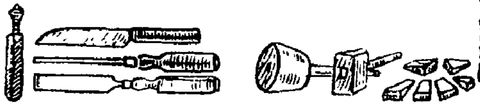
When casting from polished wood, it will be found that the model can be used without any treatment, although a coat of wax as with the marble is recommended as a further protection.

Tools.

You will need a large bowl in which to mix the plaster, and a small dish for hand use, preferably one with a good lip and seamless base; a large  spoon for mixing; a small brush for oiling the mould, a large one for



brushing it, a soft one for soaping; a sharp plaster knife for trimming the plaster, and at least two chisels and a mallet for chipping; some wood wedges, a key tool for making countersunk keyways in the edge of the moulds and some stout cord.



On Plaster.

Every time a new supply of plaster is bought, test it before use. Mix a small quantity and see that it sets firmly. This precaution may save a ruined cast. Incidentally it gives an idea of how long the new plaster takes to set.

Experience will soon teach how to gauge the mixing of plaster. The latter must be sprinkled into the water, never the water into the plaster.

For a medium consistency, take some plaster into your dry hand and let it run evenly through the fingers into the water. Be careful that large clots do not fall in. By moving your hand around over the basin, an even spread is obtained. No time must be lost in getting the plaster into the water (do not rush too much however) and when it begins to settle just beneath the top of the water, you have your " gauge." Wait a few minutes till all movement has subsided, then stir from the bottom briskly for a very short while. The plaster is now ready for use. For a thicker consistency, mix as before, but continue to add plaster until it settles well above the water. Allow for a moment to subside, then stir.

It is of the utmost importance to keep the basins and tools clean. This is easy while the plaster is soft.

For a large cast, a pail should be procured for preparing the plaster, and a large drum or barrel for washing the utensils between each lot of plaster.

On no account must wet plaster be allowed to go down a sink or drain, as it will set and block the pipes.

If the drum is used for washing utensils, tools, etc., the surplus plaster thus washed off will sink to the bottom and, when the job is finished, the water can be drawn off and the sludge at the bottom disposed of, together with the hard waste plaster from the mould.

Plaster casting of any size is a messy job and should not be undertaken where there is difficulty of cleaning up. The ideal place would be an outhouse.

The main object of a mould is to hold the shape of the model so that a cast can be made from it. As long as it is strong enough to withstand the strain of separation (opening the mould) and of handling, it serves its purpose. Do not use up plaster just because you have it to spare. Weight does not make for strength. In fact a badly constructed heavy mould is weakened by too much bulk. Experience will soon show how to reduce unnecessary plaster, but until you are certain what to leave off, make sure of strength by adding a moderate thickness.

To accelerate the setting of plaster, add alum to the water before putting in the plaster. No formula can be given as different plasters need solutions of varying strength. Try a weak solution first and increase or decrease as necessary. Alum also hardens the set plaster. Make tests on small quantities before mixing the plaster for the job.

To retard the setting of plaster, add size water (a tablespoon of thin size to three pints of water) stale beer, or ammonia to the water before slaking (mixing) in the plaster. Here again make tests on small quantities to arrive at a correct formula.

To kill plaster, gauge up and continue to stir until it is on the point of setting. This killed plaster is ideal for repairing air holes and chisel marks in the new cast as it can be modelled-in with the finger, and dries the same colour and hardness as the plaster around it.

Making a Clay "Fence."

When the mould is made in several pieces or sections, a fence or wall will be necessary to hold the plaster in check as each piece is poured.

This fence is generally made of clay, and for jobs of moderate size should be about 1½ inches wide and roughly ¼ inch thick.

Prepare fences like this. Take a roll of clay lay it on a slightly oiled slab of marble or slate (an old-fashioned washstand top is ideal). The oil is to prevent the adhesion of the clay.

Beat the roll with the ball of the hand till it is quite flat and to the required thickness. Run a knife over the surface till it is smooth, then cut into strips suitable to the job on hand. The ends left over will do to support the fence in place.

Metal "Fences."

When the model is made of clay or similar soft material, metal fences made of sheet tin or brass can be used. This is cut roughly to shape and pushed carefully into the model when it will acquire sufficient strength to stand up without further support.

Types of Moulds.

THERE ARE THREE MAIN TYPES OF MOULDS:

The Waste Mould,
The Jelly Mould,
The Piece Mould.

THE WASTE MOULD (so called because it is destroyed in the process) is used when only the one cast is required.

Plaster is applied to the model and when set, the model is withdrawn. The mould thus created is filled with fresh plaster and then broken away revealing the new cast.

(It is possible, however, when the model is a simple panel without undercut, to save the mould when withdrawing the new cast. Several casts would thus be possible.)

THE JELLY MOULD is for multiple casts in general.

The resiliency of the material permits making casts with undercuts, without any fear of the mould and cast adhering. Many casts can be made from this type of mould before the jelly becomes useless. The disadvantage of jelly is that it can only be kept for a short time, after which new jelly is necessary.

THE PIECE MOULD is also for multiple casts, its great advantage being that it can be kept indefinitely. Various pieces of moulds are made and carefully fitted together to overcome all problems of undercutting. The pieces are held together by a casing of plaster which goes over them locking them together. These moulds are imperative where moulds have to be kept in stock over a period.

Casting a low relief Panel.

PLATE 1.

Presuming the panel is a simple one with no undercut parts, you proceed as follows. *Lay the panel on a flat table, face upwards, and build a clay fence around it, leaving a margin about an inch wide (for a small panel). Wood slats can be used as a fence for this type of flat work. Fix in place with pieces of clay. Make sure that the fence is of sufficient height to cover the highest point of the model by at least an inch. Now brush the margin of table showing between the panel and fence, with clay water. This will prevent the freshly poured plaster from adhering to the table. Now proceed to pour the plaster, and when slightly set, bed reinforcing irons or wood battens half into the plaster, and further strengthen by putting lumps of thick plaster at the points where the irons cross. Allow to set, then take the fence away and turn the lot over and withdraw the panel. If this is soft material such as clay, it can be dug out taking care not to hurt the new mould. If of plaster, it may be necessary to turn the mould over again and give it sharp taps on the back when the panel will fall out. (See plate 3.)

* *Note that should the panel* have undercut parts, or if there is any doubt as to whether it will draw easily, you will have to proceed in the same manner as with the front mould of the bust (see page 15), viz., by making the mould of several coats and then chipping off (Waste Mould) or by making a jelly mould (see page 67).

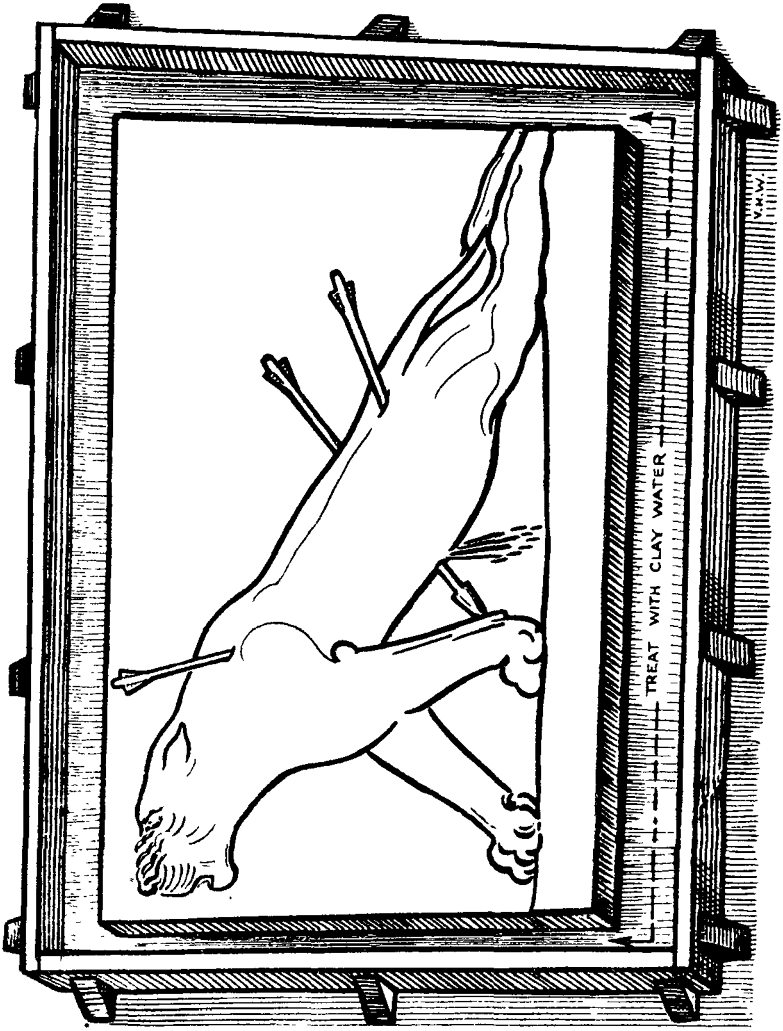


PLATE 1

PLATE 2.

Place mould under water and proceed to clean away all vestiges of the clay left by the panel, using a soft brush. A small modelling tool should be used for getting into little crevices.

Now repair any holes or damaged parts with plaster, and when all is finished and set hard, thoroughly lather the surface of the mould with a solution of soap. (Two large tablespoons of best black soap, boiled in a pint of water. Use cold.) Twenty minutes of soaping will suffice, when any surplus liquid must be poured off. Allow to stand a further twenty minutes until the surface appears dry (in hot weather it will take less).

Remove any froth that remains and make sure that no soap remains in the mould as soap is fatal to freshly made plaster. Now brush-in a very small quantity of olive oil. This should give the plaster a lustre or dull sheen. Water dropped on to it will remain on the surface like drops of mercury, and not be absorbed. (More soaping will be necessary if no sheen appears, or if the water is absorbed.) Put the mould back under water for fifteen minutes to ensure the plaster being thoroughly saturated as, should it be a little dry, it will absorb the water from the freshly poured plaster of the cast and cause air holes.

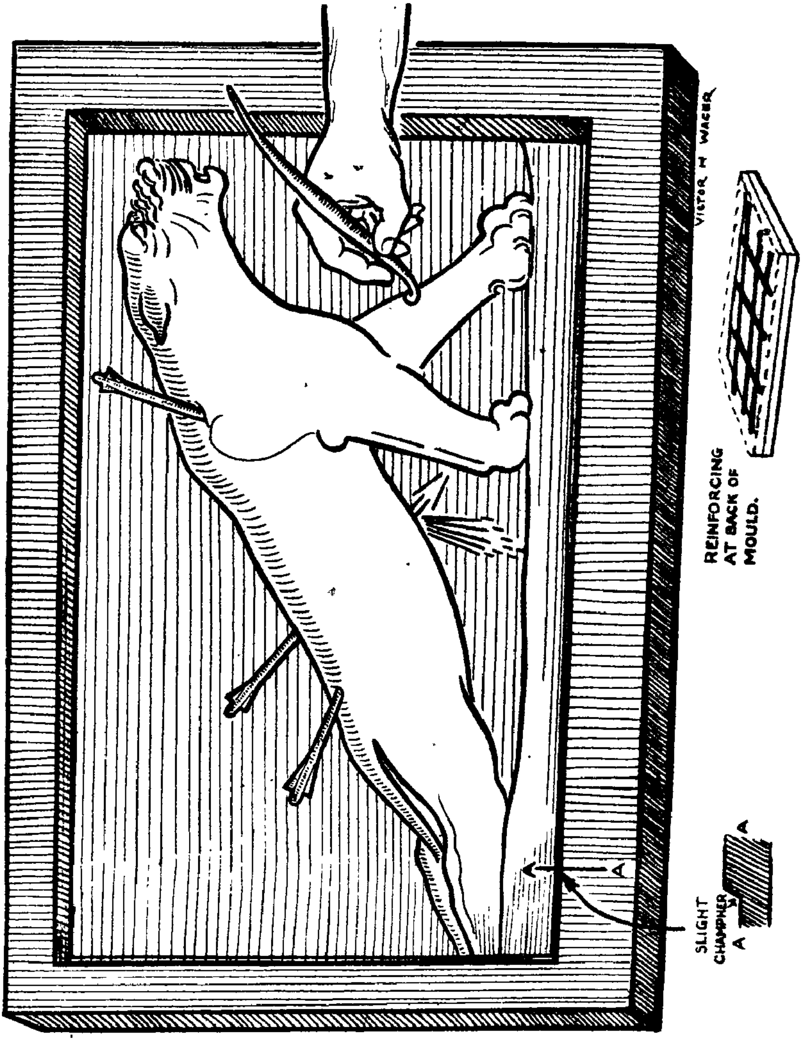


PLATE 2.

PLATE 3.

A: Take the mould out and allow it to drip well, and when free of surplus moisture, lay it on its back and pour in a fairly thin plaster. Rock the mould to make certain that no air locks occur at corners. If necessary blow into the plaster to make it spread. Then pour surplus liquid back into the dish. Repeat this process until the plaster in the mould is about ¼ inch thick. In a very large mould, it will be found convenient to apply the plaster with a soft brush.

B and C: The new cast will need some reinforcement and, for this cut several squares of scrim* (a kind of sacking). Soak these in water and then in some thin plaster, and press them, one by one, in the plaster in the mould. Make sure they cover everywhere, and carefully see that none of it goes right through the plaster. In bigger panels, use wire netting and reinforcement as well as scrim.

D: You will, no doubt, wish to hang up the new cast when finished, and for this make two hooks of galvanised or brass wire. Bend them so that the eyes are set level with the edges of the mould. Put them into place and fill up the mould with fresh plaster.

E: While still a little soft clean off and level the back. Allow half an hour to set when, if a good champher has been made (see plate 2) the cast will fall out quite easily.

F: Turn the mould over into some soft padding. An old blanket is ideal.

G: Proceed to carefully inspect the new cast and should there be any air holes, fill these in with killed plaster (see page 4 killed plaster). If there are any breakages, hollow out the inside of the break, being careful not to touch the outside edges, wet thoroughly then fill with fresh plaster and hold the two pieces together until set, when it can be cleaned up. Now turn the cast over, cut a clearing under the two hooks, and the cast is finished ready for bronzing or colouring, when dry.

* Use fine scrim inside casts. Coarser scrim can be used for moulds.

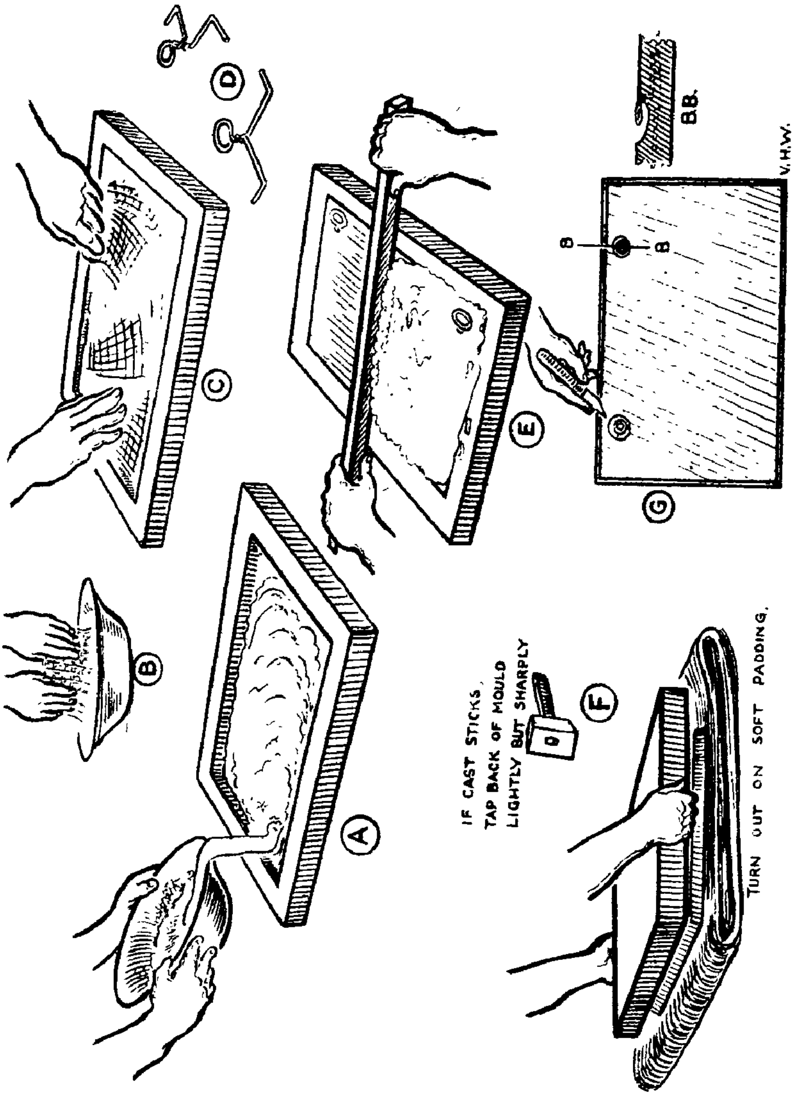

A
B
C
D
E
F
G
IF CAST STICKS, TAP BACK OF MOULD LIGHTLY BUT SHARPLY
TURN OUT ON SOFT PADDING.
B
B
B.B.
V.H.W.

PLATE 3

Making a Waste Mould: A life size Bust.

This will be found more complicated than the flat panel.

A bust is "in the round," that is to say, there is a front, sides and back, and the mould will therefore have to be made in more than one piece. An ordinary bust, like the example chosen, can be moulded in two· one piece for the front and one for the back.

As there are a number of undercut parts, it will be found impossible to make a solid mould like that of the panel for the cast will not draw out of the mould. To overcome this the mould will have to be broken away after casting, and the mould must therefore be made easy to break by building it up in thin coats, brushed with clay-water to prevent adhesion. After the cast is poured, these coats being thin will flake away easily with a chisel, and the new cast is soon uncovered. To indicate how far you have gone in the chipping, the first thin coat put on the model must be made coloured so that when chipping away, the coloured coat will indicate when to take extra care with the chisel. When finally the coloured coat is all exposed, you chip this away using extra care, and the white of the fresh cast underneath gives full indication of the progress of the work.

PLATE 4.

First proceed to make the front mould. For this, frame the bust with a fence so as to divide the front from the back. Start at the top centre of the head, pass down round the hair, taking one ear in the front section, and leaving the other for the rear mould.* (This makes the subsequent job of getting the clay out of the ears, much easier.) The fence clay should be just damp enough to adhere to the model without stickiness, and it is advisable to dust the model with French chalk where the fence passes. This permits clean subsequent removal. Keep the fence well in front of the ear so that the plaster will go in easily. Aim to have this front mould bigger than the rear one. This will facilitate separation of the two moulds. As mentioned in the preface, I am assuming that the model is of clay or other soft material. If the student prefers, he can therefore use the metal fence instead of the clay fence (see page 5). This is a quick and easy method of fence construction.

* If desired the fence can be built to include both ears in the front section. This is a matter of opinion and for the student to decide for himself by experiment.

FENCE IN POSITION
THIS SURFACE WILL FORM THE JOIN OF THE MOULD.
VICTOR H WAGER

PLATE 4.

PLATE 5.

This shows the fence in place, from the back. Note supports (pieces of clay) holding it in position. Care must be taken to leave no gap between the fence and the model, or plaster will seep through when pouring. Keep a neat smooth surface on your fence and this will give a nice face to the edge of the mould and thus ensure a good join.

Having completed the fence, cover the entire surface of the rear of the model with damp soft paper to protect it from splashes that will fall on it when working on the front. Slightly wet newspaper will do. Start from the top as shown but underlap lower sheets. Where possible a single sheet is preferable.

FENCE SUPPORTS.

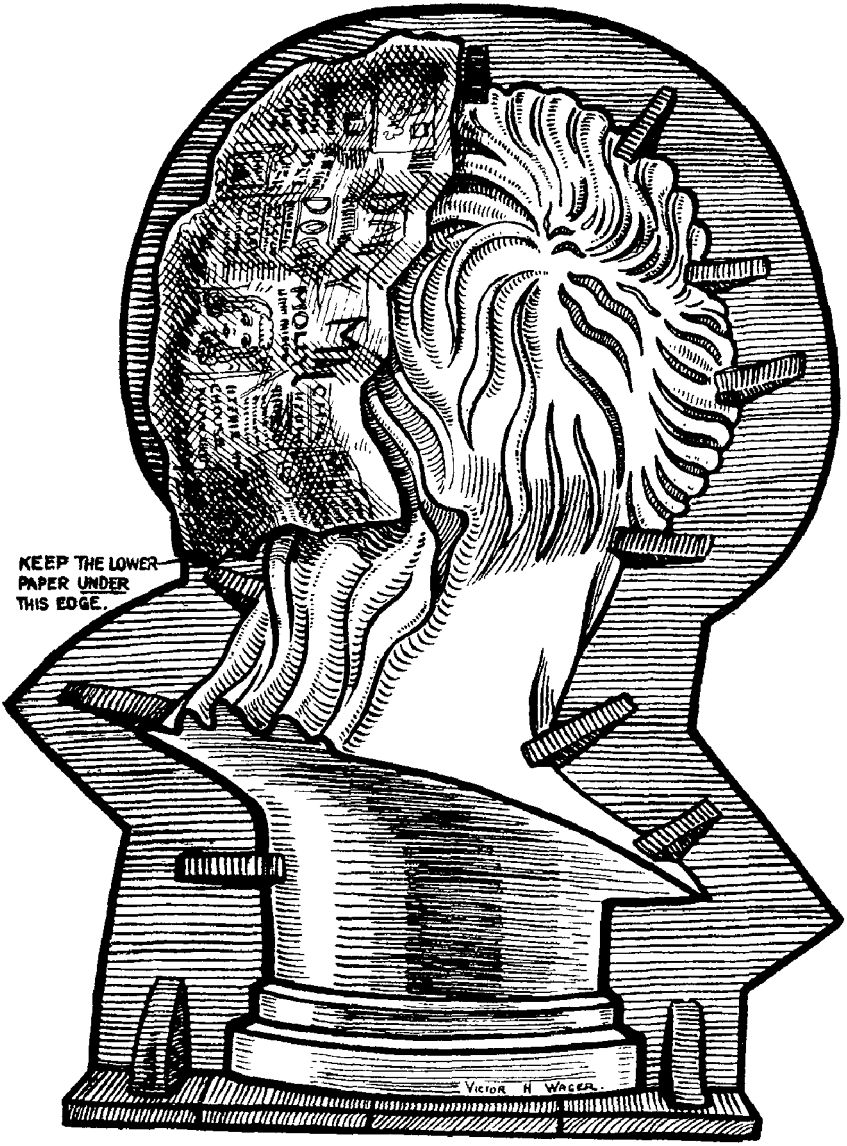


PLATE 5

PLATE 6.

Having completed the fence, you proceed with putting on the first coat of plaster. This, as explained, should be a coloured one, and you must therefore add a large spoonful of red or yellow ochre to the water when preparing the plaster. A blue bag will do quite as well. Remember the plaster will tone down the colour so make the water much darker than appears necessary.

When the plaster is ready, fill your small dish and, holding it close to the model, scoop up some of the plaster with your fingers and flick in on to the model.* Do the deepest parts first (eyes, ear, etc.). Where you cannot flick it, blow it in, and it will spread. You must be quick or the plaster will set. (It is advisable for the beginner to slow down the setting by adding size. See page 4.) Begin at the top and work down till all is covered to the thickness of ¼ inch. When it has set a little, add extra thickness to all protruding parts (nose, etc.). Leave final surface rough, do not smooth in any way, in fact if the surface is rather smooth, do not hesitate to roughen a little.

When quite hard, dab with clay-water. This, as stated before, is to facilitate subsequent separation from the coat above it when chipping away. Do not clay-water near the edge of the mould however. It is imperative that at least an inch margin should be left untouched so that the next coat adheres. This will ensure a strong mould. Clean your board after each coat, it is easy to gather up, and use, the fallen plaster while soft. If the board is littered with pieces of set plaster, this is no longer possible.

* On a big job use a flat ladle to flick the plaster on.

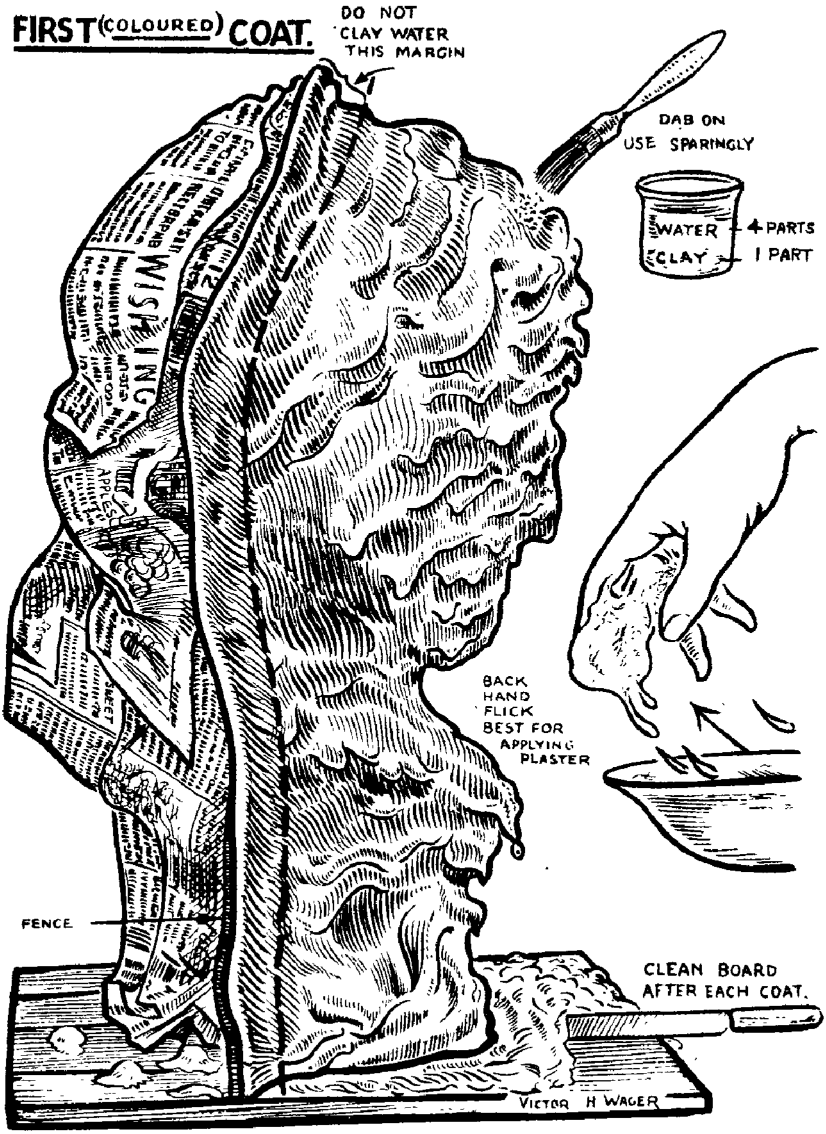

FIRST (COLOURED) COAT.
DO NOT CLAY WATER THIS MARGIN
DAB ON
USE SPARINGLY
WATER 4 PARTS
CLAY 1 PART
BACK HAND FLICK BEST FOR APPLYING PLASTER
FENCE
CLEAN BOARD AFTER EACH COAT.
VICTOR H WAGER

PLATE 6

PLATE 7.

The second coat (no colouring) should be of thicker consistency than the first. Flick on as before to the thickness of ½ inch. Reinforcing irons will now be necessary. These should be previously bent to shape, making certain they rest against each other wherever they cross. Use ¼ inch round or square section iron for a life size bust, and fix in place with lumps of fresh thick plaster as shown.

If the model is rather plain, without undercut parts, it will be possible to make do with only two coats for the mould. In this case tie the re-inforcing irons together with strips of plaster-soaked scrim. It must be remembered however that only the experienced moulder will know exactly the minimum strength required for a mould. This strength is given its full test when separating the moulds when very heavy stress occurs. If in doubt therefore, you must proceed with a third and final coat of plaster.

First clay-water as before, leaving margin clean.

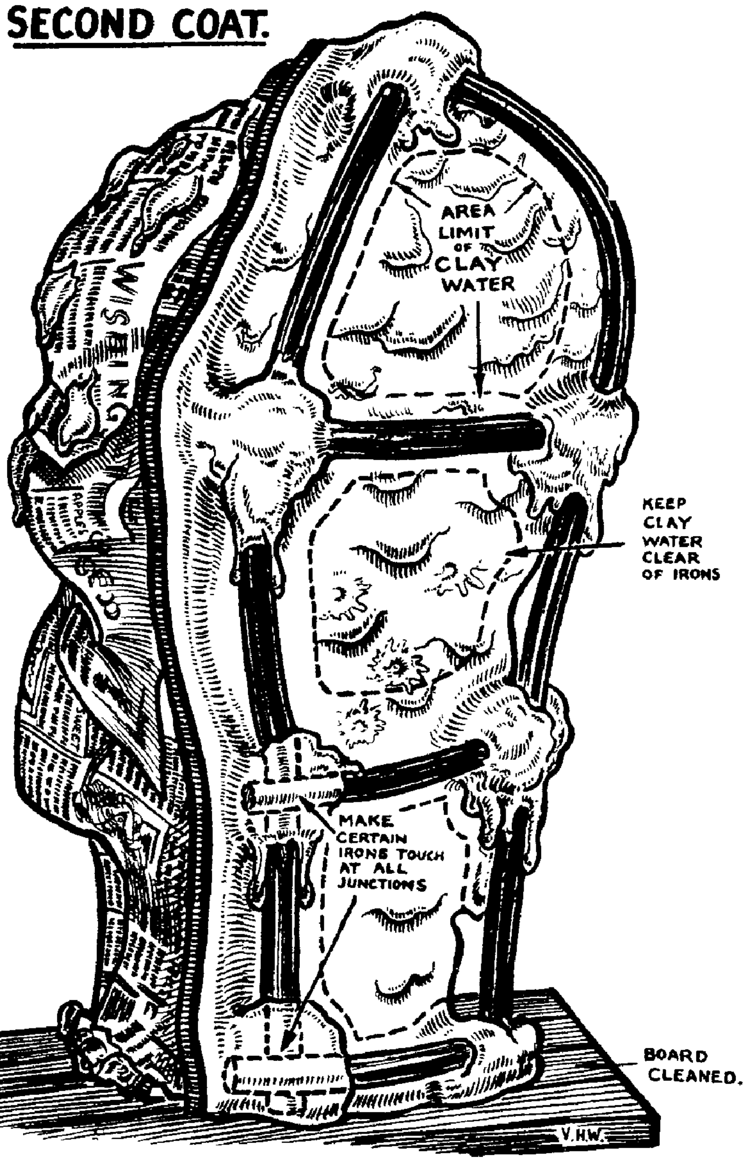

SECOND COAT.
AREA LIMIT OF CLAY WATER
KEEP CLAY WATER CLEAR OF IRONS
MAKE CERTAIN IRONS TOUCH AT ALL JUNCTIONS
BOARD CLEANED.
V.H.W.

PLATE 7.

PLATE 8.

The third coat (no colouring) is, as stated, put on when extra strength is necessary. This, in contrast with the previous two, is a smooth one, and it binds the irons and other coats into one strong mass. When you have flicked on this final coat, allow it to set slightly, then smooth over with a wet hand. Do not overdo, as slightly set plaster is easily killed, and then would not set.

THIRD (FINAL) COAT.

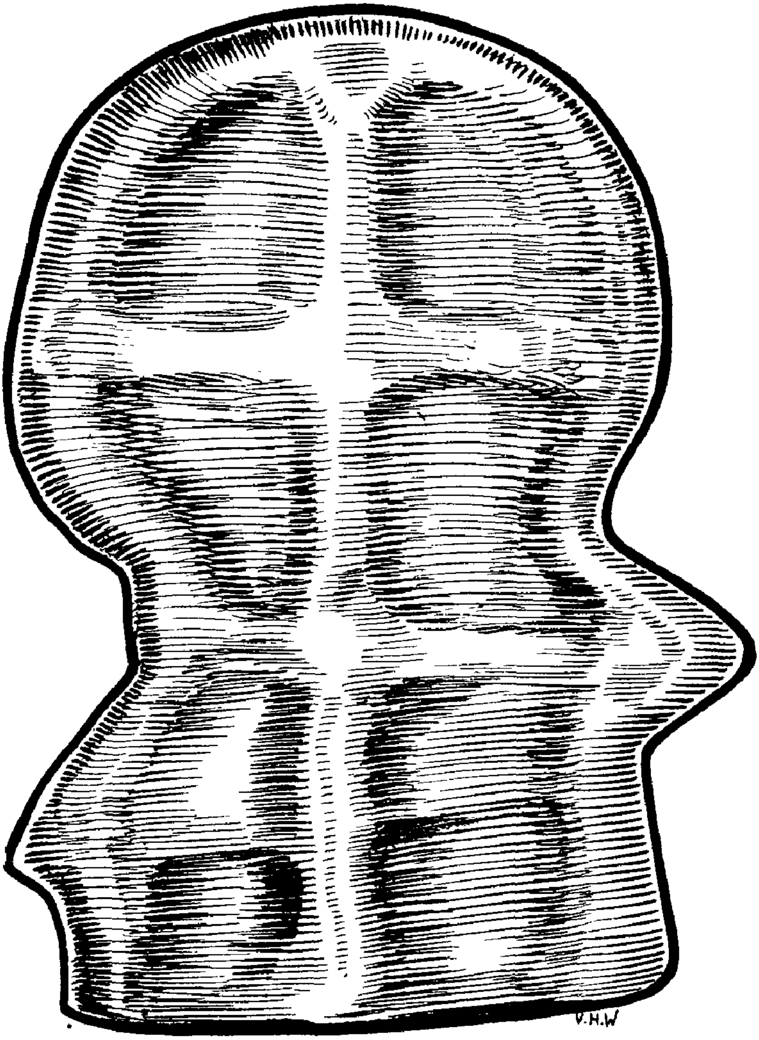


PLATE 8

PLATE 9.

Allow half an hour for the plaster to set, then prepare for making the back mould.

First take away the damp paper and clay fence, being careful of the modelling.

Now with a sharp knife cut V knotches (joggles) in the edge of the front mould, as indicated and, in between these, countersink keyways. Remember to protect the modelling with a small damp cloth while cutting them, as the shavings will cause annoyance if they get on to the modelling.

Now brush the edge of the mould with clay-water, also quite a bit of the side so that any surplus splashed on to it while doing the back mould, can be easily removed.

Finally, put wedged shaped pieces of clay in position as shown (these wedges are $\frac{1}{2}$ inch across and $\frac{1}{4}$ inch thick at the thick end). Keep the thin end [illegible] inch away from the model, and let the thick end stick well out of the mould. The wedges act as guides subsequently for the wood wedges used for separating the moulds. They must be placed so as to get maximum leverage possible.

A larger piece of clay is placed on the top of the mould measuring about two inches long and half an inch thick. This will leave a reservoir for water when separating the mould (plate 11), it should extend right on to the clay of the model.

PREPARING JOIN.

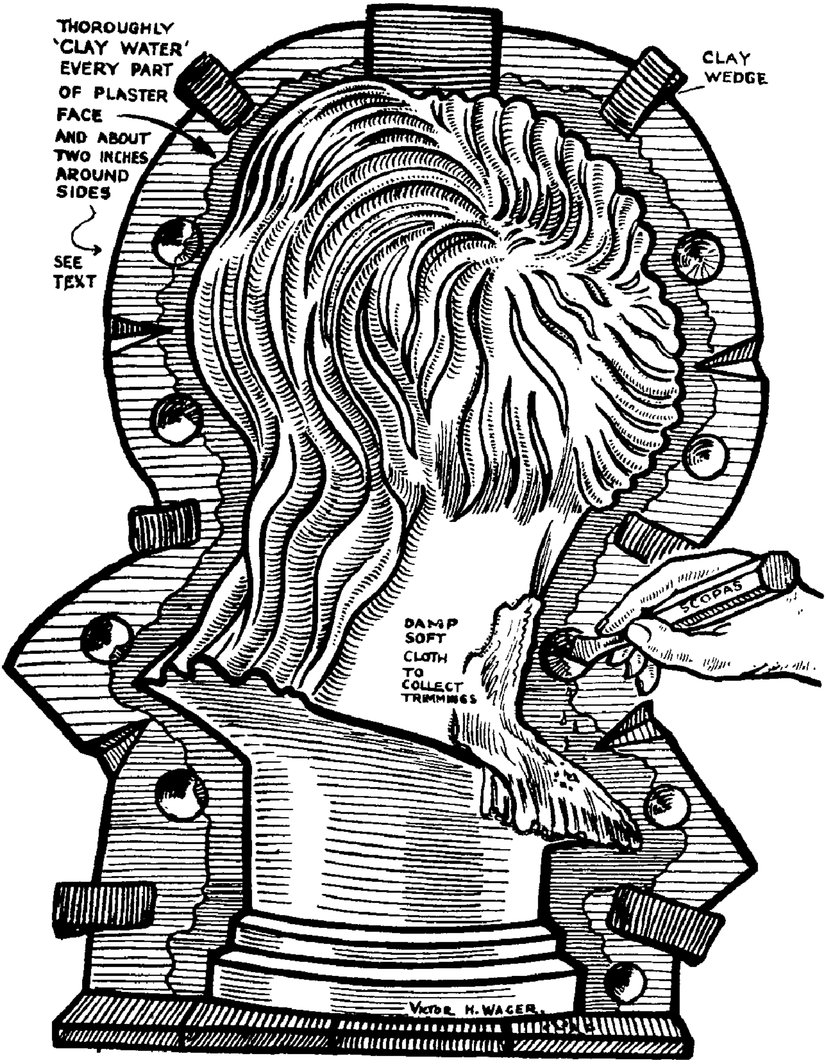


PLATE 9.

PLATE 10.

For the back mould, repeat the process described for the front, making two or three coats, whichever you have decided upon.

When the whole mould is completed, allow it to set for a good hour before attempting to open.

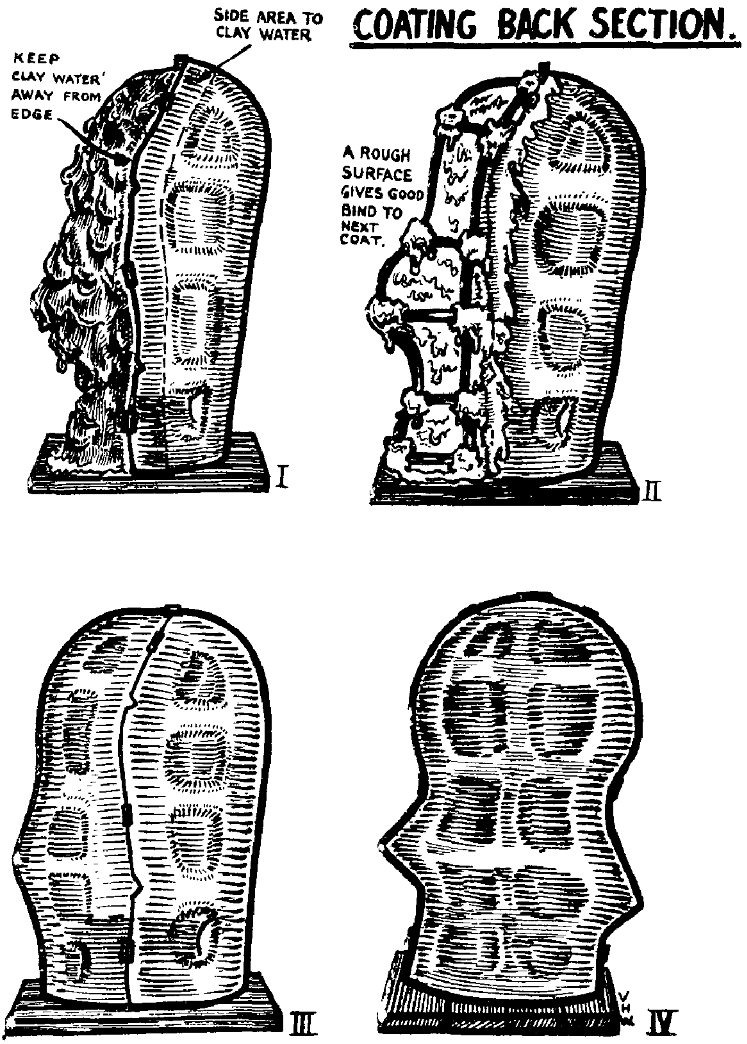

COATING BACK SECTION.
SIDE AREA TO CLAY WATER
KEEP CLAY WATER' AWAY FROM EDGE
A ROUGH SURFACE GIVES GOOD BIND TO NEXT COAT.
I
II
III
IV

PLATE 10

PLATE 11.

To separate mould, first soak thoroughly in water.* Now prepare some blunt wood wedges. If too sharp they will cut the mould, and if too thick they will fret away its edges without opening it. A little experimenting will soon show which shape suits this purpose.

Dig out clay reservoir on top of mould and fill with water.

Tap wood wedges into the clay wedges. Continue to tap them in rotation, applying water to reservoir. It should not be long before the back mould is free and can be lifted away. Empty the front mould of all the clay, beginning from the centre and working outwards to the edges of the mould. When the centre is cleared, it will be found that the clay at the edges can be folded inwards.

The two moulds are now ready for final cleansing and inspection.

* If the model is of plasticine or wax, soak in hot water, as this softens the material and it will be easier to draw the mould away.

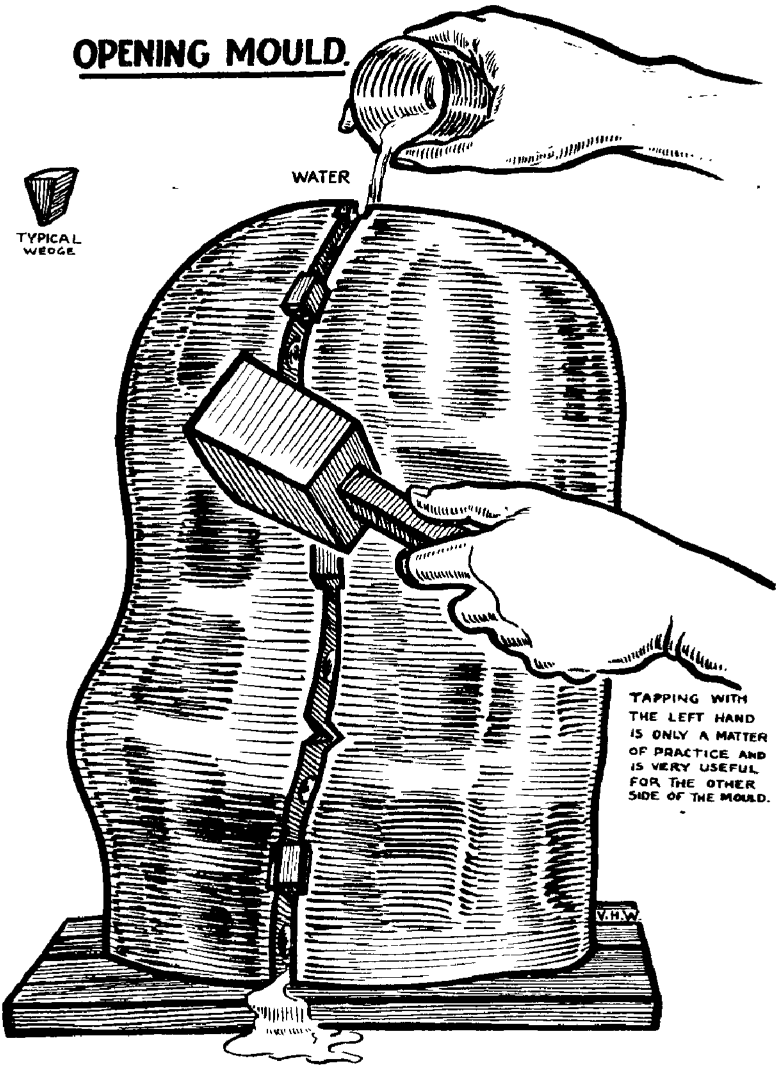

OPENING MOULD.
WATER
TYPICAL WEDGE
TAPPING WITH THE LEFT HAND IS ONLY A MATTER OF PRACTICE AND IS VERY USEFUL FOR THE OTHER SIDE OF THE MOULD.
V.H.W.

PLATE 11.

PLATE 12.

Place the two moulds under a tap and allow the water to run into them. With a soft brush, clean all the clay away. Small deep crevices which the brush cannot reach, should be cleaned out with a small modelling tool. Any air holes or damaged parts should now be repaired.

Immerse the two moulds in water and prepare the solution of soap, as with the panel (boil two large tablespoons of best black soft soap in a pint of water. Use cold. If obtainable, liquid soap is preferable as this can be used without preparation).

Pour a cup-ful of solution into the moulds directly you take them from the water and, with a soft brush, thoroughly lather the entire surfaces. Twenty minutes soaping should suffice.* Having poured off any surplus liquid, allow a further twenty minutes till the surface appears dry. (In hot weather this may only take a few minutes.) Any froth and all vestiges of the soap must now be cleaned away as soap will spoil the surface of the plaster which is poured into the mould.

A very small quantity of olive oil should now be brushed in thoroughly. This should give a dull lustre to the surface and, as stated before, water dropped on to it should remain on the surface like drops of mercury, and not be absorbed. (More soaping will be necessary if the water is absorbed.)

Now put both moulds into water again for about fifteen minutes. This ensures them being thoroughly saturated, and prevents them from absorbing water from the plaster which is poured in. This would cause air holes.

* Another method of treating the surfaces of the mould is to shellac them while damp, with two coats. Then grease with olive oil mixed with tallow. This method is quicker than soaping. Coats should be thinly applied or they will flake off on to the cast.

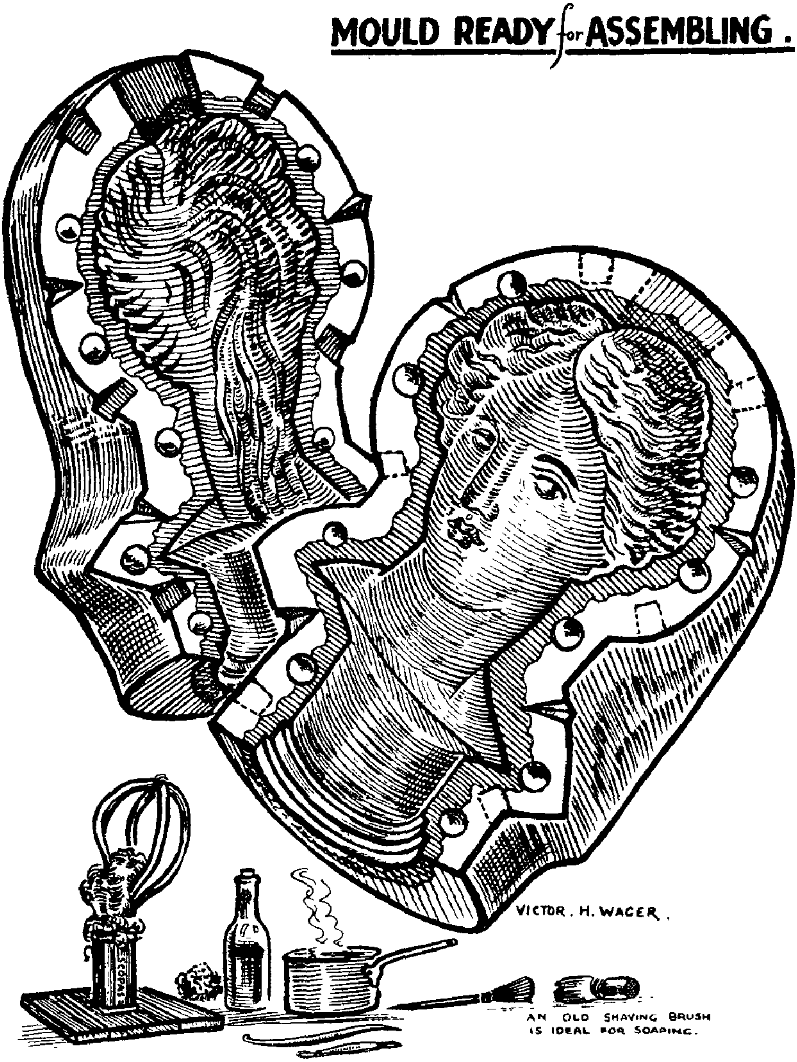

MOULD READY for ASSEMBLING.
VICTOR. H. WAGER.
AN OLD SHAVING BRUSH
IS IDEAL FOR SOAPING.

PLATE 12

PLATE 13.

Take the two moulds out, allow them to drip well and, when free of surplus moisture, put them together carefully and tie securely. Wedges, and any other sound means of torsion, should be utilised to ensure them being closely and tightly joined.

For the first attempt you may prefer to make a solid cast,* and for this, prepare enough plaster to fill the mould.

Pour a little in and turn the mould about in every direction so that all air is excluded and the plaster has penetrated into every crevice.

After a few minutes of this, empty out the surplus and pour in some more again quickly. Repeat this until the plaster coat in the mould begins to thicken when at least one reinforcing iron, which has been previously painted to prevent corrosion, should be inserted. Then fill the mould right up, and when slightly set level off the base. Allow to set for one hour.

* *For a hollow cast,* pour in a little plaster and turn the mould round and round, gradually bringing it down from a vertical to a horizontal position, thus ensuring the plaster reaching every part. Pour the surplus out, and immediately pour back a little more. Repeat until the inside is coated to a depth of ⅛″ to ¼″ when squares of plaster soaked scrim should be pressed carefully into every part. Now pour some more plaster in and repeat the process described above until a total thickness of about ½″ is reached. Level off the base when slightly set and then allow an hour to set thoroughly. For extra safety and precaution, the second coat should be mixed with size water. This slows the setting to allow for manipulation of the scrim, and toughens the plaster when set.

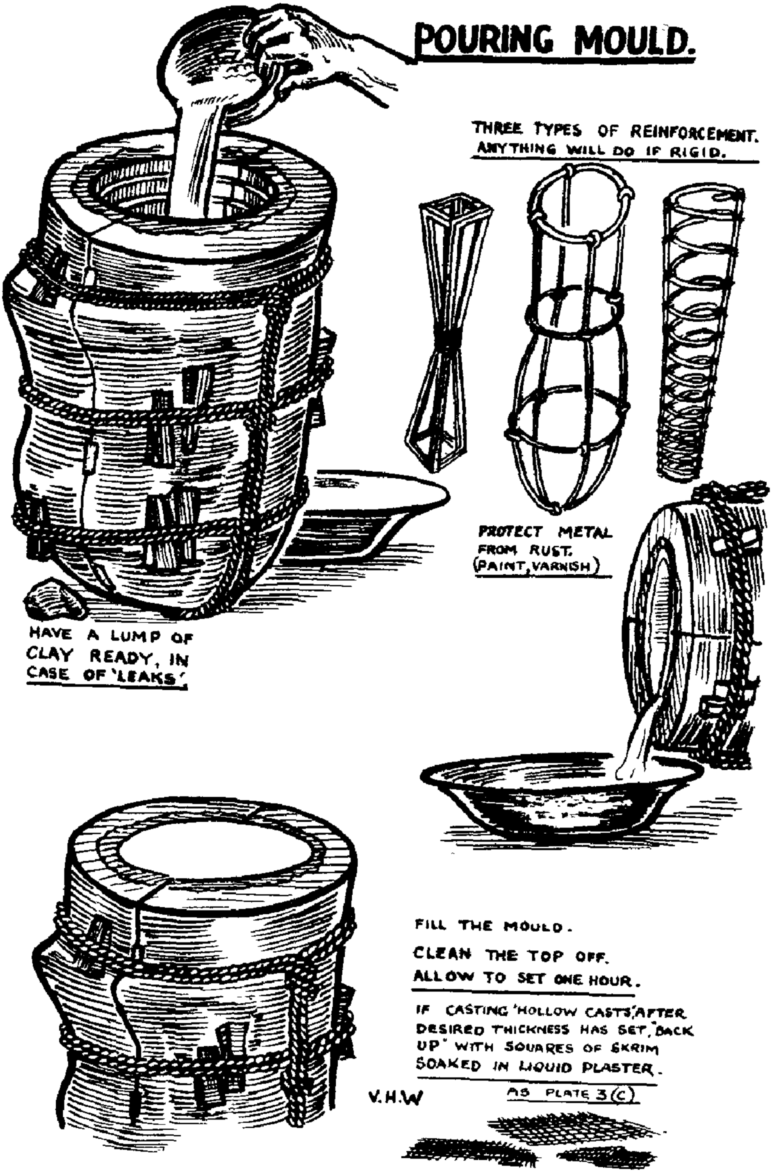

POURING MOULD.
THREE TYPES OF REINFORCEMENT.
ANYTHING WILL DO IF RIGID.
PROTECT METAL FROM RUST. (PAINT, VARNISH)
HAVE A LUMP OF CLAY READY, IN CASE OF 'LEAKS'.
FILL THE MOULD.
CLEAN THE TOP OFF.
ALLOW TO SET ONE HOUR.
IF CASTING 'HOLLOW CASTS', AFTER DESIRED THICKNESS HAS SET, "BACK UP" WITH SQUARES OF SKRIM SOAKED IN LIQUID PLASTER.
V.H.W
AS PLATE 3(C)

PLATE 13

PLATE 14.

When the plaster has set, proceed to get the mould off. This is done by chipping, and it will be found a fascinating job.

Unearth the irons first and take them away, then start chipping, using a blunt chisel. Wherever you break through to the coloured coat, leave that part and carry on elsewhere until all the white coats are off and only the coloured coat remains. Do not be in a hurry. Use light taps on the chisel, holding it ready to draw away as soon as the plaster gives. If you bury the point, pull it out and begin nearby. Break the plaster after two or three taps, or you may go right through into the cast. When the coloured coat is all uncovered, proceed with chipping this away in the same way, leaving the supporting plaster under all delicate or overhanging parts. This can be removed later and will greatly lessen risk of breakages. Should any part be broken, hollow-out slightly in the break, taking care not to touch the edges, wet thoroughly and fill with fresh plaster. Hold the broken parts together until set, then clean up where necessary.

All chisel marks and air holes should now be repaired. This is done by using killed plaster and modelling it in with the fingers. Do not use fresh plaster as it will dry a different colour and harder than the cast. Remove the seam left by the mould, and the cast is finished.

CHIPPING THE MOULD AWAY.

FINAL STAGES.

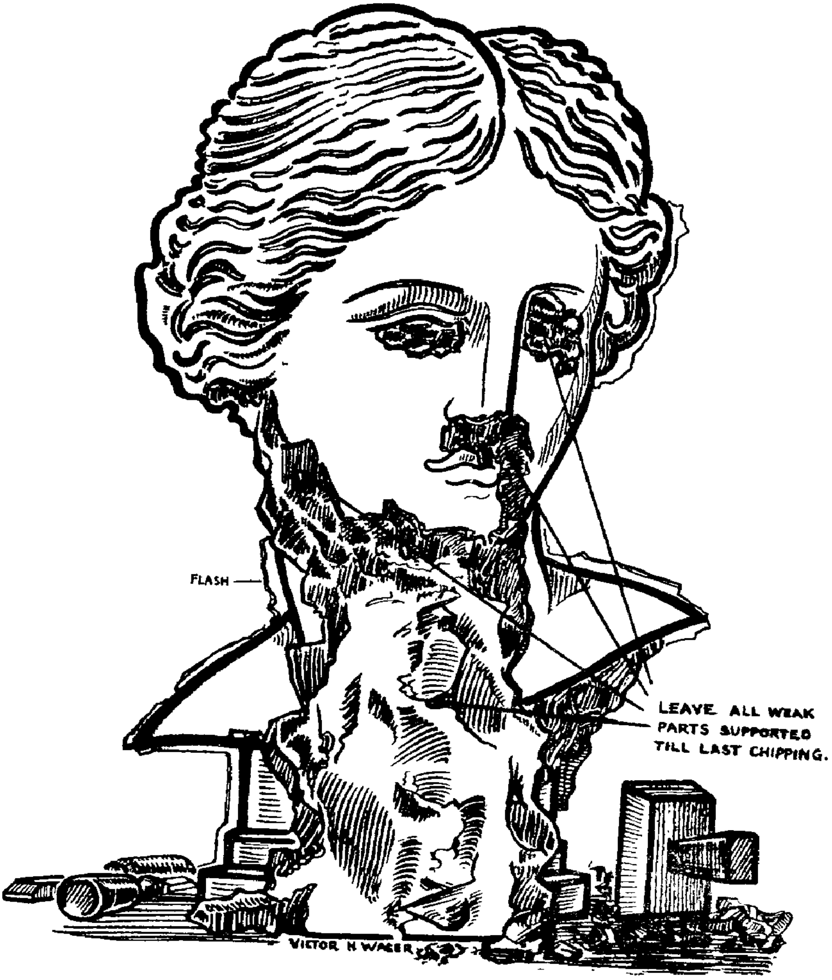


PLATE 14

Making a Waste Mould: A Full Figure.

Casting a figure entails the same process as that used in casting the bust, though a rather more involved one.

Where an arm or leg is in an awkward position, it may be advisable to cut it off and cast separately, joining it to the figure afterwards. This is a difficult job however, and should not be attempted without an experienced teacher.

PLATE 15.

The present example presents no difficulty with the arms and legs, and they can be cast in one piece with the rest of the figure.

Run the clay fence round the figure and outside the arms. Build it right across the gap between the legs and do this wherever a similar division occurs.

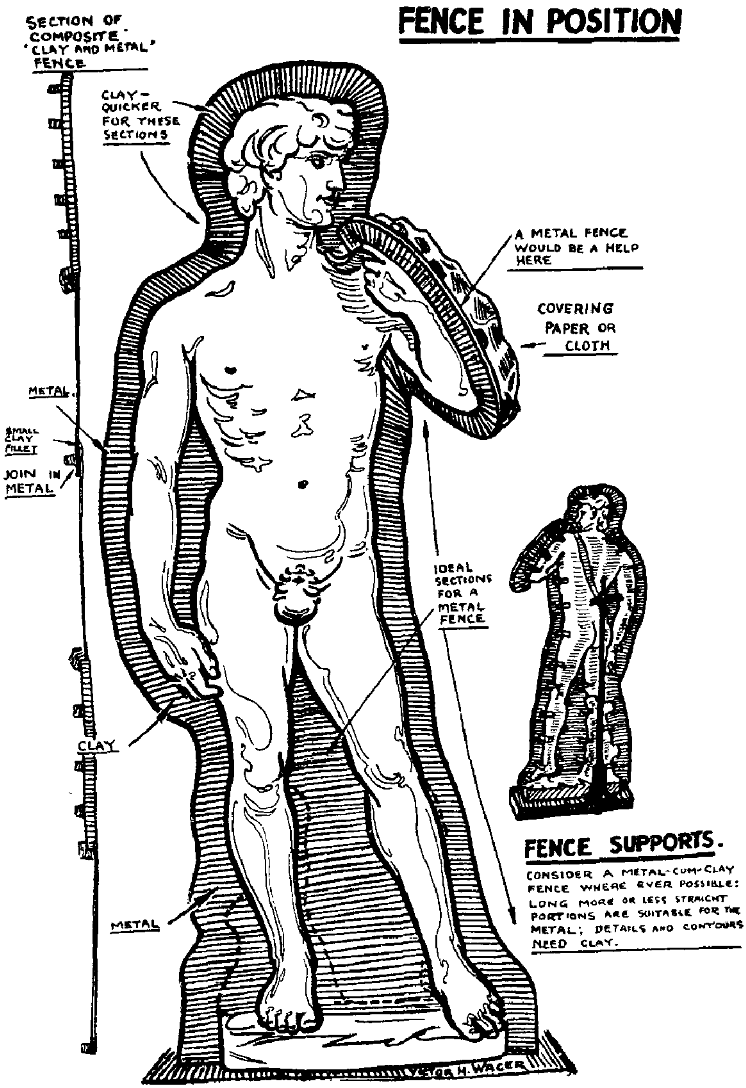

FENCE IN POSITION
SECTION OF COMPOSITE 'CLAY AND METAL' FENCE
CLAY—QUICKER FOR THESE SECTIONS
A METAL FENCE WOULD BE A HELP HERE
COVERING PAPER OR CLOTH
METAL.
SMALL CLAY FILLET
JOIN IN METAL
IDEAL SECTIONS FOR A METAL FENCE
CLAY
METAL
FENCE SUPPORTS.
CONSIDER A METAL-CUM-CLAY FENCE WHERE EVER POSSIBLE: LONG MORE OR LESS STRAIGHT PORTIONS ARE SUITABLE FOR THE METAL; DETAILS AND CONTOURS NEED CLAY.
VICTOR H. WAGER

PLATE 15.

PLATE 16. (Compare with Bust, plate 6.)

Protect the back part with soft paper; then flick on the first (coloured) coat. Use large flat ladle instead of fingers on a big job. Clay-water as with the bust, then put on second coat. It is of paramount importance that the front mould (the larger and more important of the two) be extremely rigid and strong, and great attention must therefore be paid to the iron reinforcements and their placing.

NOTE.—For half life figures use $\frac{1}{4}$ inch to $\frac{1}{2}$ inch irons.

For life size figures use $\frac{1}{2}$ inch to $\frac{3}{4}$ inch irons.

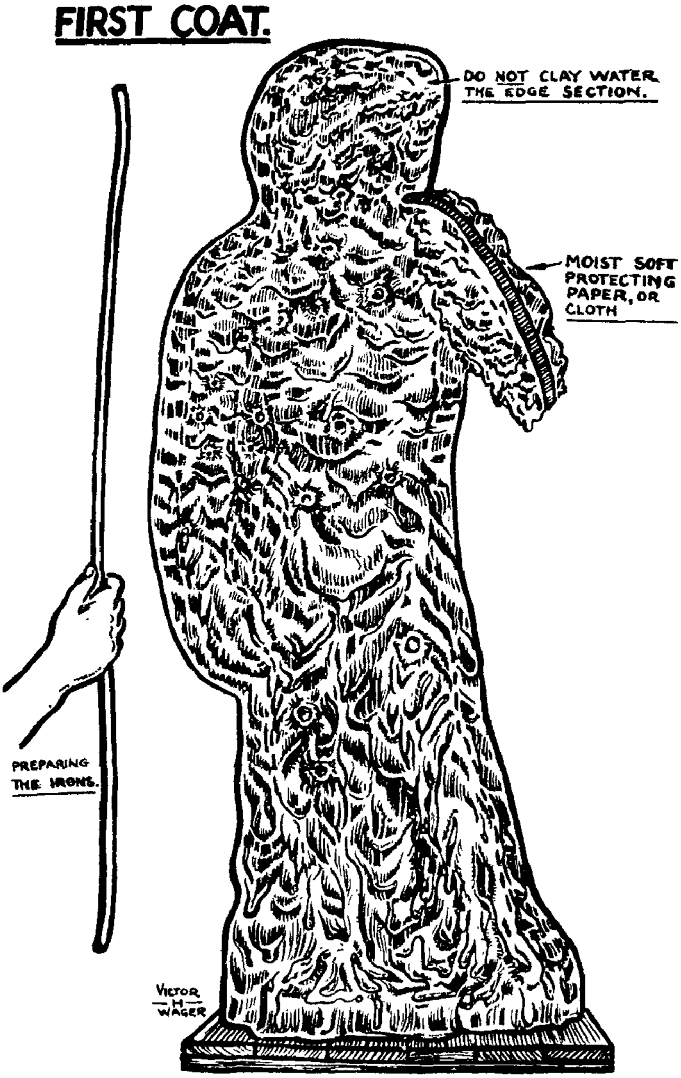

FIRST COAT.
DO NOT CLAY WATER THE EDGE SECTION.
MOIST SOFT PROTECTING PAPER, OR CLOTH
PREPARING THE IRONS.
VICTOR H WAGER

PLATE 16

PLATE 17. (Compare with Bust, plate 7.)

By careful reinforcing, this front mould will take the great strain that occurs when the completed mould is separated for the first time. This is a powerful strain and a broken mould at this stage, while not hopeless, is trouble enough. Fix irons in place with lumps of plaster as before and tie together at junctions with strips of plaster soaked scrim. If extra strength is required add a third coat.

SECOND COAT

PLATE 17

PLATE 18. (Compare with Bust, plate 8.)

The completed front half mould with third (smooth) coat, for extra strength.

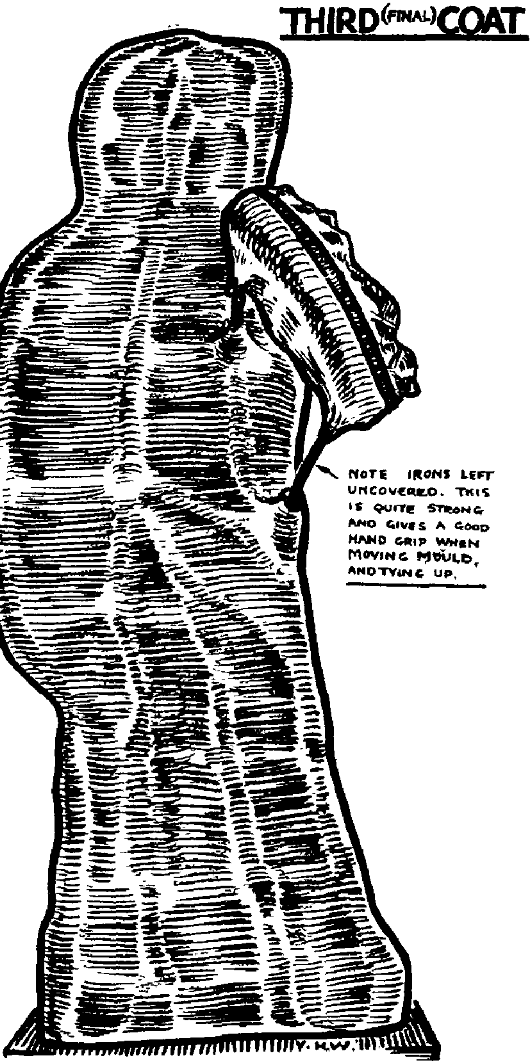

THIRD (FINAL) COAT
NOTE IRONS LEFT UNCOVERED. THIS IS QUITE STRONG AND GIVES A GOOD HAND GRIP WHEN MOVING MOULD, AND TYING UP.

PLATE 18.

PLATE 19. (Compare with Bust, plate 9.)

Prepare to proceed with back mould; remove clay fence and damp paper, prepare countersunk keyways, joggles and clay wedges on the edge of front mould. Clay-water this edge thoroughly and then proceed with first (coloured) coat, second coat, irons, and final coat. Should the armature support be a sliding one, the main part of the back mould can be made in one piece. If a fixed support is being used, it will be necessary to make it in two pieces, in which case proceed with the bottom half first as illustrated, keeping top half of the modelling covered with damp paper as usual. Also, put half an inch of clay round the support where it enters the body. This will give clearance when separating the moulds.

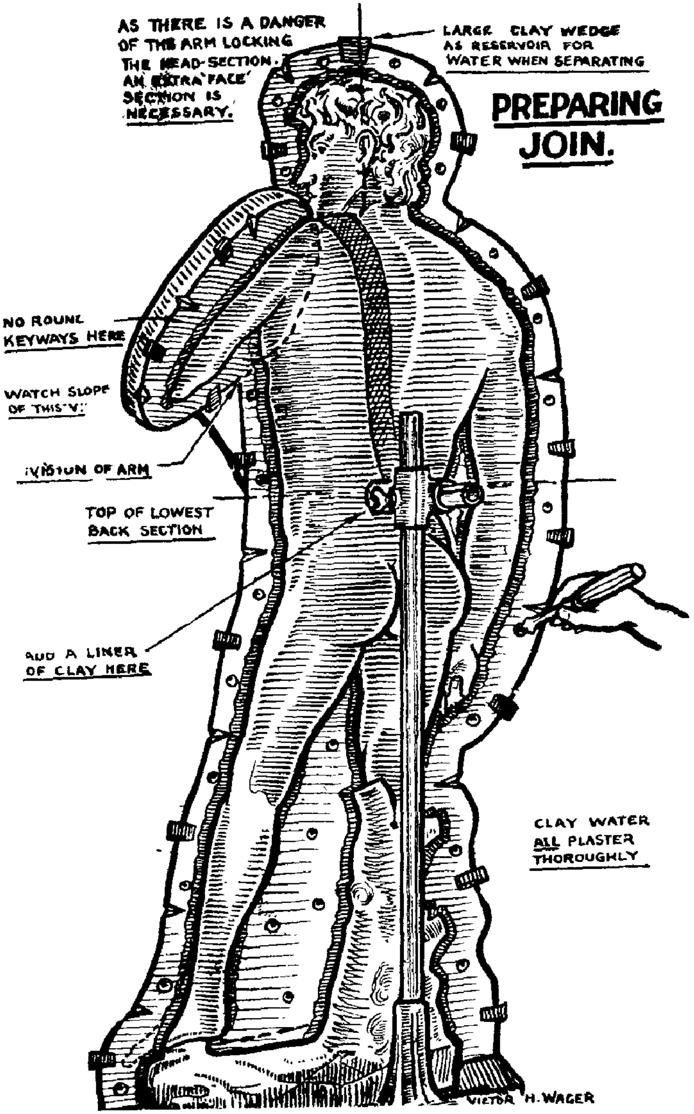

AS THERE IS A DANGER OF THE ARM LOCKING THE HEAD-SECTION, AN 'EXTRA' FACE' SECTION IS NECESSARY.
LARGE CLAY WEDGE AS RESERVOIR FOR WATER WHEN SEPARATING
PREPARING JOIN.
NO ROUNE KEYWAYS HERE
WATCH SLOPE OF THIS 'V.'
IVISION OF ARM
TOP OF LOWEST BACK SECTION
AND A LINER OF CLAY HERE
CLAY WATER ALL PLASTER THOROUGHLY
VICTOR H. WAGER

PLATE 19

PLATE 20.

Should there be any likely hindrance in separating this back mould from the front, it will be necessary to make an extra section or two. In the present case the arm would impede the removal of the part over the face. Make a small separate mould over the face, keeping your damp paper over exposed modelling. Do not make countersunk keyways on these sections of moulds as these will prevent them sliding out. Clay-water all edges, keep the edge of the face mould sloping so that it will draw out easily. The arm too will need a separate mould, and make this also with sloping edge and without keyways. In the illustration the back top mould is in place first but in practice it would soon become apparent which part to do first.

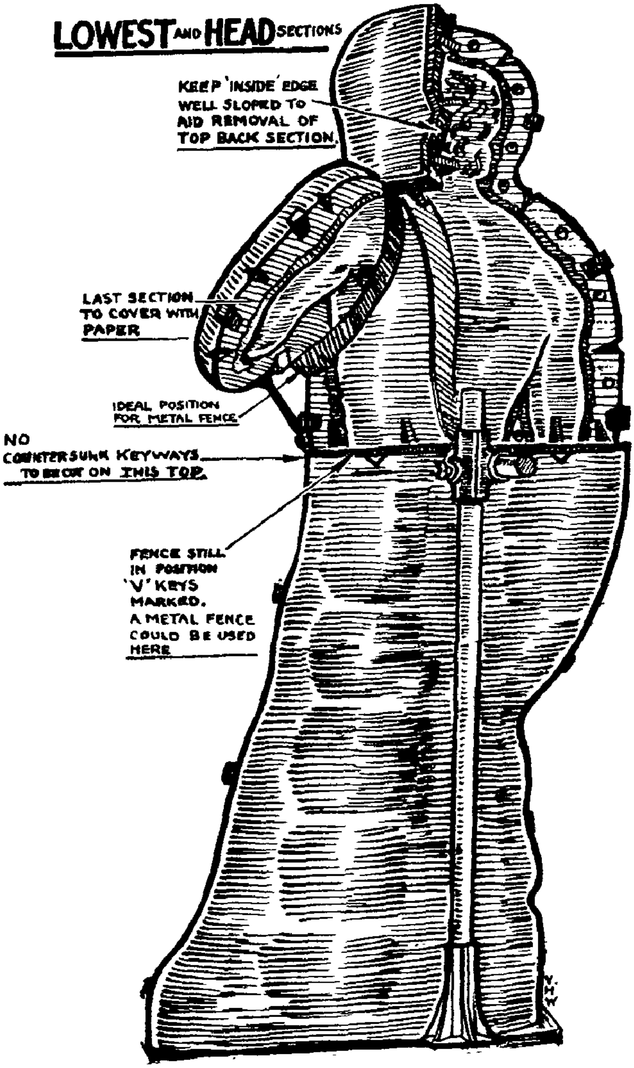

LOWEST AND HEAD SECTIONS
KEEP 'INSIDE' EDGE WELL SLOPED TO AID REMOVAL OF TOP BACK SECTION.
LAST SECTION TO COVER WITH PAPER
IDEAL POSITION FOR METAL FENCE
NO COUNTERSUNK KEYWAYS TO BE CUT ON THIS TOP.
FENCE STILL IN POSITION 'V' KEYS MARKED. A METAL FENCE COULD BE USED HERE

PLATE 20

PLATE 21. (Compare with Bust, plate 10.)

Having completed the entire back of the mould, allow to set for one hour. Prepare the soft soap and wedges.

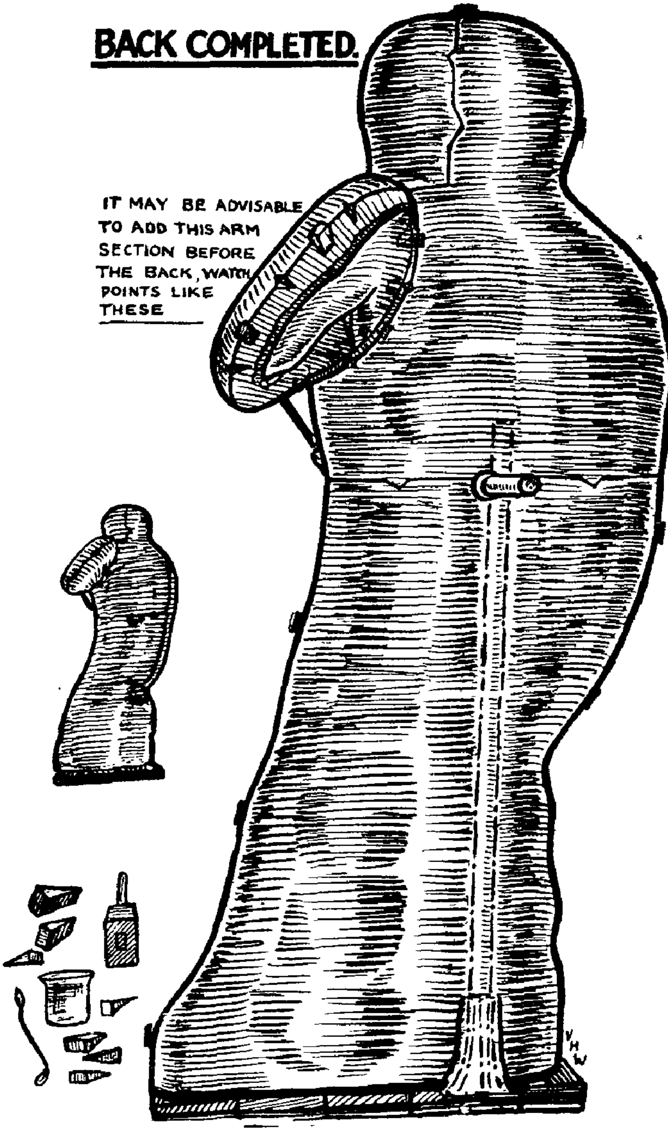

BACK COMPLETED.
IT MAY BE ADVISABLE TO ADD THIS ARM SECTION BEFORE THE BACK, WATCH POINTS LIKE THESE
V H W

PLATE 21.

PLATE 22. (Compare with Bust, plate 11.)

Separating the mould should be undertaken in the reverse order of building—the last section built should be the first off. Insert wide chisel into clay wedges of this section and gently prise off, applying water to the seam. The large clay cavity in the top of the head should be kept filled with water so that immediately the mould gives the slightest bit, the water level will drop. This gives an indication of how the work is progressing and also the water permeates into the crevices and helps the separation.

Remove the main upright of the support and proceed with the removal of the main back mould, tapping wedges into the clay ones.

If a non-sliding support is being used, remove the top half mould and clean out all the clay you can reach, bending the armature piping clear, cutting it where necessary. The bottom half mould can possibly be removed after the front mould is off. If not, the support may have to be cut. Do not attempt to save the support at the expense of the mould. This latter is now all important. Treat it so.

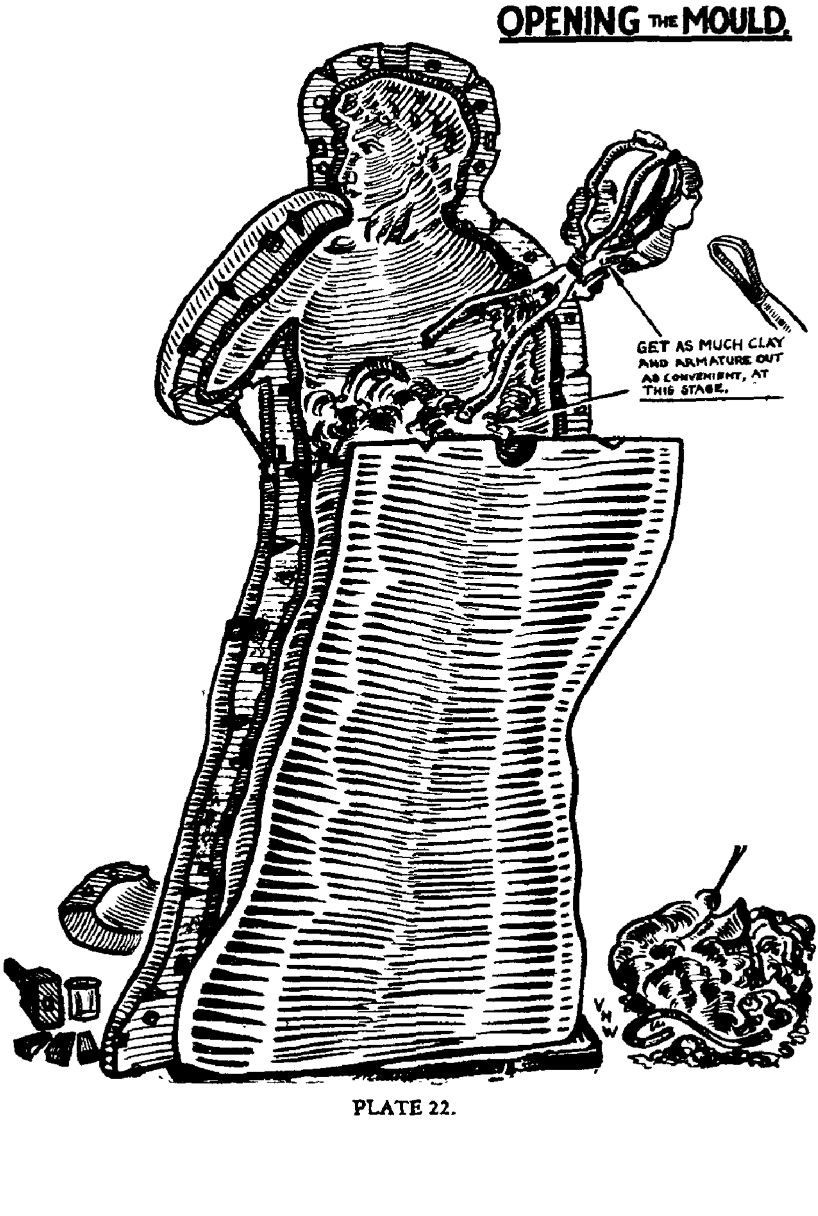

OPENING THE MOULD.
GET AS MUCH CLAY AND ARMATURE OUT AS CONVENIENT, AT THIS STAGE.
V H W

PLATE 22.

PLATE 23.

Having removed or separated all the moulds, proceed to prepare the reinforcing irons. These are most important, and they must be carefully shaped to occupy the centre of the limbs, etc. Support as you go, with pieces of clay. The bottom ends of the irons must be bent at right angles so that they can be embodied into the plinth. Without the strength imparted by these right angle bends, the entire reinforcing would collapse. Use wire for the fingers. (In small figures use electric lead-covered wire which has four or five strands. These strands can be used for the fingers.)

When the correct shapes have been attained, remove the irons and clean out the clay lumps. Now paint the irons to prevent corrosion, as this would soon work through to the surface of the cast and stain it.

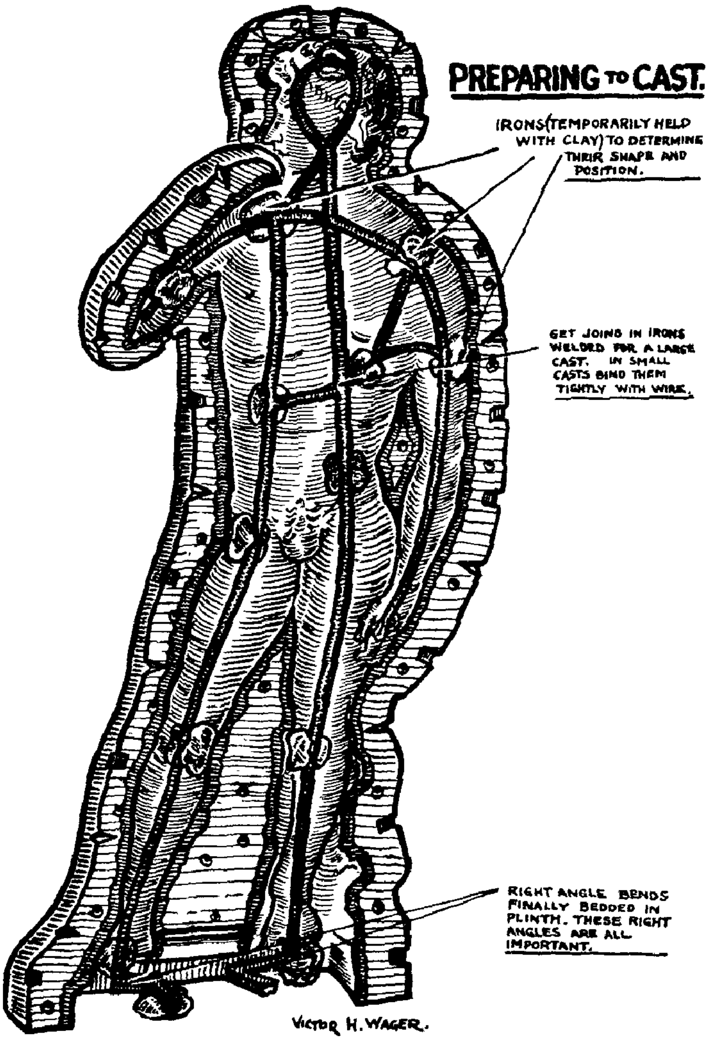

PREPARING TO CAST.
IRONS (TEMPORARILY HELD WITH CLAY) TO DETERMINE THEIR SHAPE AND POSITION.
GET JOINS IN IRONS WELDED FOR A LARGE CAST. IN SMALL CASTS BIND THEM TIGHTLY WITH WIRE.
RIGHT ANGLE BENDS FINALLY BEDDED IN PLINTH. THESE RIGHT ANGLES ARE ALL IMPORTANT.
VICTOR H. WAGER.

PLATE 23.

PLATE 24. (Compare with Bust, plate 12.)

Clean all clay out of the moulds with water and brush, using small modelling tool for crevices where the brush cannot reach.

Now immerse the moulds in water, if too large for this, play a hose on them. Plenty of water is essential.

Proceed with soaping the moulds with solution as before. Thoroughly brush for twenty minutes and, having poured off surplus solution, allow a further twenty minutes until the surface appears dry. (This will take only a few minutes in hot weather.) Froth and all vestiges of soap should now be cleaned off carefully as soap will spoil any plaster poured on to it. As before, brush in a very little olive oil until a dull lustre appears. Water dropped on this should remain on the surface like blobs of mercury and not be absorbed by the plaster.

When soaping and oiling is completed, put both moulds back into water for fifteen minutes. This is to avoid them absorbing water from the fresh plaster when it is poured in, as this will cause air holes.

The moulds are now ready for irons and assembly.

Should the moulds be left for some time, remember to tie them together tightly to avoid possible damage or warping, and remember to again soak thoroughly before use.

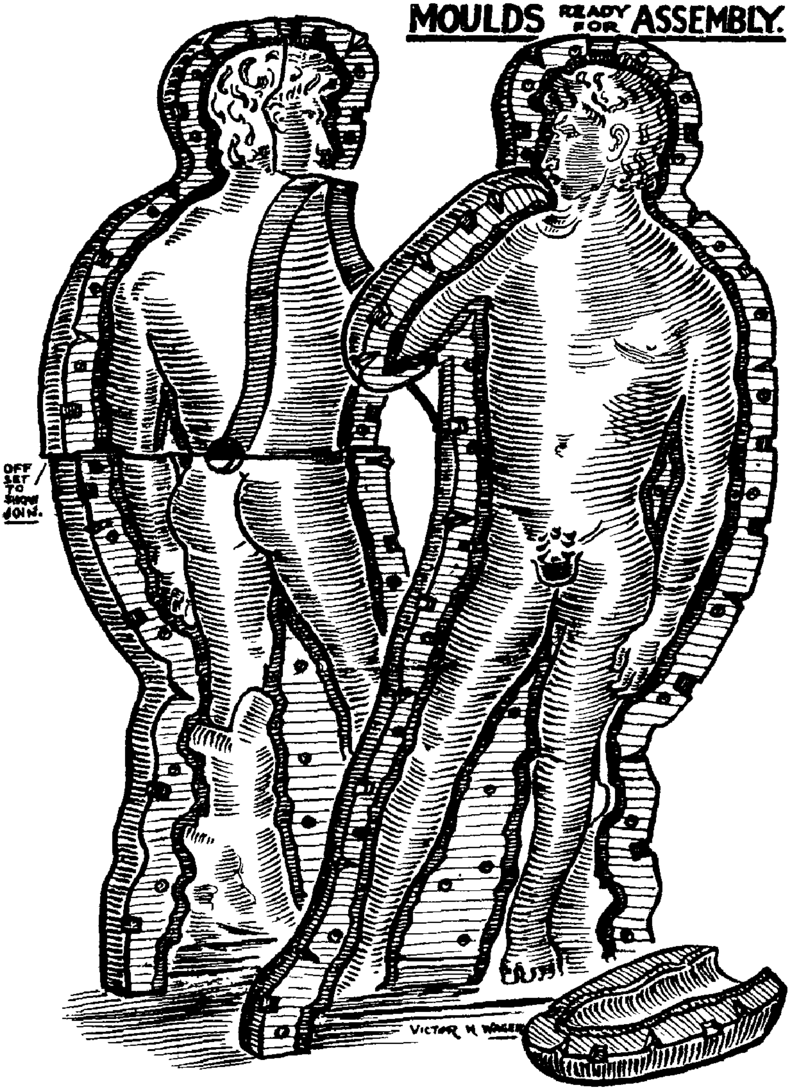

MOULDS READY FOR ASSEMBLY.
OFF SET TO SHOW JOIN.
VICTOR H WAGER

PLATE 24

PLATE 25 (Compare with Bust, plate 13.)

Coat the lacquered irons with a little plaster, leaving rough finish. Place them in position in the front mould beginning with the leg pieces, fixing in place with lumps of thick plaster. On no account hinder the passage through the bottlenecks caused by the ankles as the plaster is poured through these. Anchor the irons next at the hips, well to the side, away from where the plaster will pour.

Do the same with the arms and head, remember all the time about the necessity of leaving a clear passage past these anchoring lumps of plaster.

Allow a few minutes for the plaster of the irons to set.

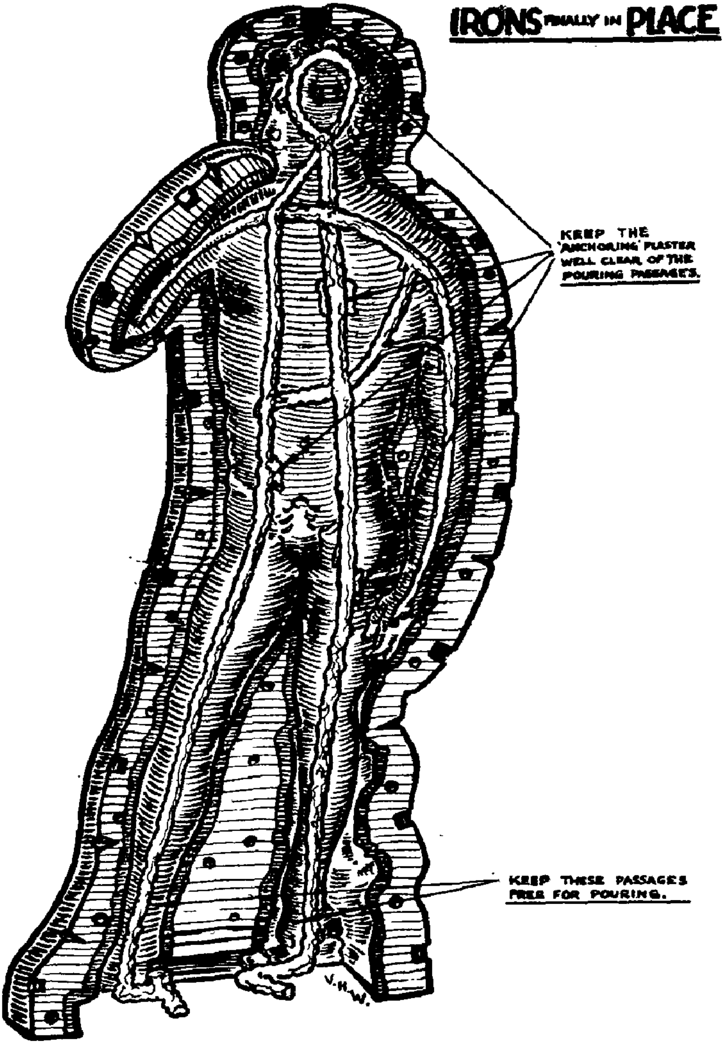

IRONS FINALLY IN PLACE
KEEP THE 'ANCHORING' PLASTER WELL CLEAR OF THE POURING PASSAGES.
KEEP THESE PASSAGES FREE FOR POURING.
V.H.W.

PLATE 25.

PLATE 26. (Compare with Bust, plate 13.)

Put the moulds together carefully, and tie firmly using large wedges to prevent any chance of slipping. Cut nicks where the cords pass over the corners of the mould, to ensure this. Damp the cords and they will bind tighter still. Note position of wedges.

Fill the hole in the back mould left by the support, with clay and keep some soft clay handy for stopping possible leaks. Start pouring in some thin plaster and turn the mould in all positions from the vertical to the horizontal, to make sure the plaster reaches all parts. After a minute or so of this, pour out the surplus and then pour some more in quickly. Continue this way until the mould is filled.* Allow to settle for a moment, then clean off and level the base at the top. Allow to set for two hours.

* Experience is necessary for making a hollow cast of a figure.

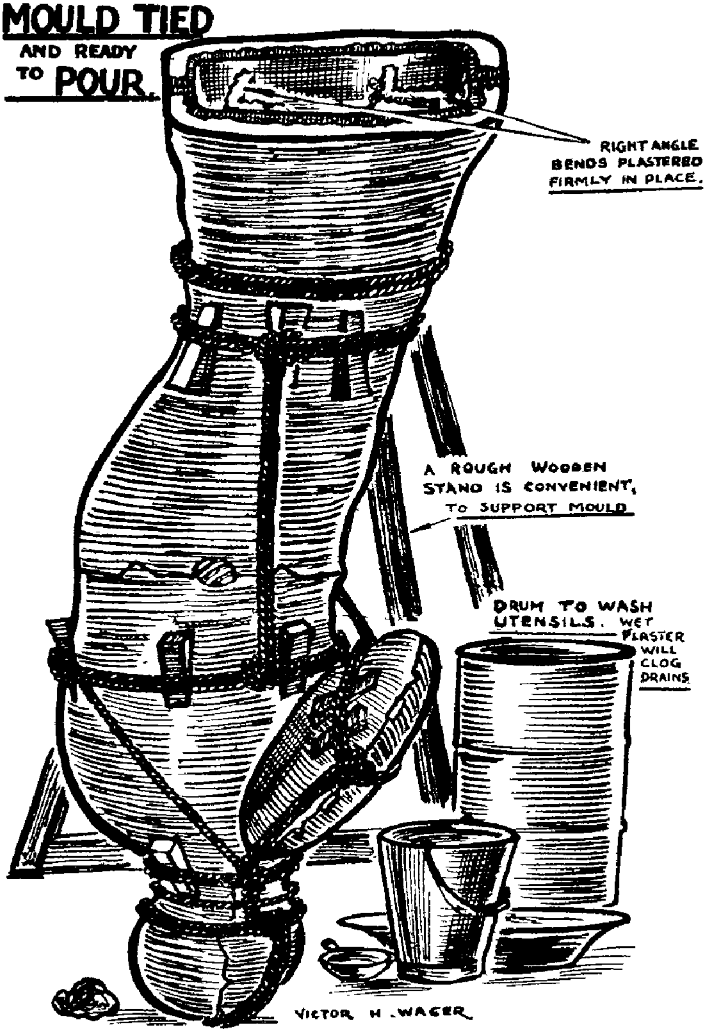

MOULD TIED
AND READY
TO POUR.
RIGHT ANGLE
BENDS PLASTERED
FIRMLY IN PLACE.
A ROUGH WOODEN
STAND IS CONVENIENT,
TO SUPPORT MOULD
DRUM TO WASH
UTENSILS. WET
PLASTER
WILL
CLOG
DRAINS
VICTOR H. WAGER

PLATE 26

PLATE 27. (Compare with Bust, plate 14.)

When set, proceed to chip as with the bust. First remove cords and then reinforcing irons. Chip away all the white coats until only the coloured coat remains. Remember—a short sharp tap on a very blunt chisel is best, keeping the chisel ready to pull back immediately a fracture occurs.

Leave the supporting plaster under overhanging parts until last.

Clean off seams, and touch up where necessary, and the cast is ready for colouring or founder.

Chipping a mould is thrilling work. When properly constructed the plaster coats flake away crisply and as the final coloured coat disappears, revealing the new cast, the joy of accomplishment is great.

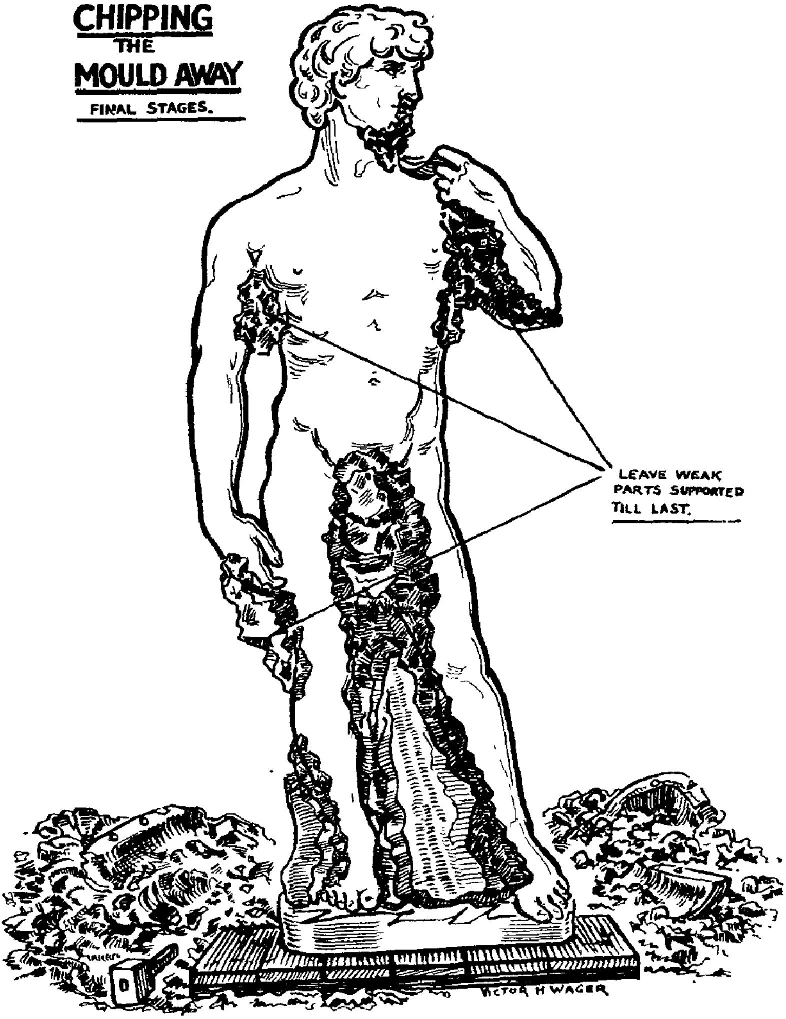

CHIPPING
THE
MOULD AWAY
FINAL STAGES.
LEAVE WEAK
PARTS SUPPORTED
TILL LAST.
VICTOR H WAGER

PLATE 27.

Making a Jelly Mould of a Bust.

A jelly mould will permit multiple casts to be made from the one mould. Being elastic, it has the further important advantage that it will allow undercut parts to draw easily, when it will spring back ready for the next cast.

THERE ARE TWO MAIN METHODS OF MAKING A JELLY MOULD OF A BUST. In both methods, a plaster case is made for holding the jelly. This case is generally in two parts—one for the back and one for the front. The difference in methods lies in whether the pouring of the jelly is done in one pouring or in two. I am describing both methods here, but favour the former as being quicker.

First however, I would draw your attention to the question of the gelatine itself.* It is essential to buy the best quality only. This is hard, clear, and free from cloudiness or flecks, will break tough and sharp leaving a starry irregular line at the edge. It will not melt in cold water, but assume a jelly consistency, and will absorb more water than a cheaper quality. Cheap gelatine breaks easily with a smooth edge which shows its lack of strength and, when damp, will smell unbearably after a few days.

* It is now possible to buy rubber jelly. This is more expensive than gelatine, but lasts indefinitely.

PLATE 28.

To make jelly, soak the gelatine in cold water until it is quite soft, then put it into a glue pot. If you prefer to make up a special jelly pot, refer to the diagram given on plate 28. The principal of the carpenter's glue pot is observed. Keep the hot water above the level of the jelly, otherwise the top jelly will burn and ruin the entire stock. Note the covering to keep in heat and steam. A stirring stick should be provided through a hole in the lid, and a rest put under the jelly pot to hold the weight. Proceed to dissolve over a slow heat and when thoroughly liquid, allow to cool until a skin has formed on top. With a wet (or greased) finger, try the heat. Jelly should not be poured until it is cool enough for you to hold your finger in it. If it is poured too hot, it will melt the shellac painted on the model and plaster casing, and gum everything together hopelessly. If poured too cold, it will not run properly and will thus leave gaps in the mould. A comfortable heat on the finger is the best guide. In hot weather, a few drops of carbolic in the jelly pot, each time the jelly is melted, will help to keep it. Jelly dissolved in vinegar instead of water, is rendered tougher and more elastic, and keeps better.

A: *Making the jelly mould in one pouring.* First shellac the model, and when dry, slightly oil the shellac to prevent adhesion. Then outline the base of the model in pencil on the table. This is to enable you to replace it in its exact position should it be moved whilst making the mould. If you can fix the model to the table in some way, all the better.

Now make a pad of clay ¾ inch thick and cover the model completely with it, leaving the outside surface perfectly smooth. Make the pad a little thicker where the fence will be constructed. The clay pad represents the thickness of the jelly, and it is important to have extra strength where the edges will be, as these edges get handled when pulling the jelly mould away from the cast.

B: When satisfied that the new covering will draw well, put four or five pips on each side as shown. These pips are conical pieces of clay about two inches long.

C: Now build a clay fence two inches wide all round the padded model, in the same manner as with the waste mould (see plates 4 and 5). Add a round plug of clay at the top of the head. This will leave a hole in the plaster casing through which you will pour the jelly.

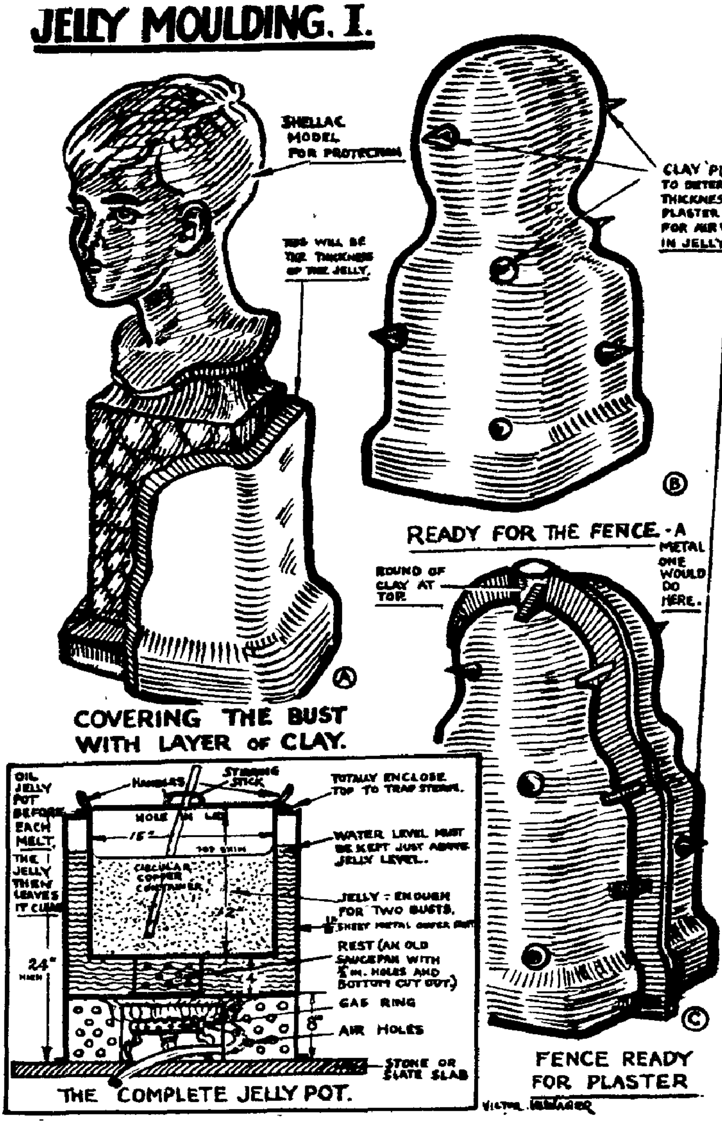

JELLY MOULDING. I.
SHELLAC MODEL FOR PROTECTION
THIS WILL BE THE THICKNESS OF THE JELLY.
CLAY 'PIPS' TO DETERMINE THICKNESS OF PLASTER AND FOR AIR VENTS IN JELLY.
(A)
COVERING THE BUST WITH LAYER OF CLAY.
(B)
READY FOR THE FENCE - A METAL ONE WOULD DO HERE.
ROUND OF CLAY AT TOP.
(C)
FENCE READY FOR PLASTER
OIL JELLY POT BEFORE EACH MELT. THE JELLY THEN LEAVES IT CLEAN
HANDLES
STIRRING STICK
TOTALLY ENCLOSE TOP TO TRAP STEAM.
HOLE IN LID
15"
TOP SKIN
WATER LEVEL MUST BE KEPT JUST ABOVE JELLY LEVEL.
CIRCULAR COPPER CONTAINER
JELLY - ENOUGH FOR TWO BUSTS.
12"
REST (AN OLD SAUCEPAN WITH ½ IN. HOLES AND BOTTOM CUT OUT.)
24" HIGH
4"
GAS RING
8"
AIR HOLES
STONE OR SLATE SLAB
THE COMPLETE JELLY POT.

PLATE 28.

PLATE 29.

A: Make a two inch thick (solid) plaster case over the rear section. (Use reinforcing irons if doing a big job.) When set, remove the fence and cut countersunk keyways in the edge. Clean and soap and oil it thoroughly.

B: Proceed with the front case in the same way. While it is setting, prepare a wood frame in two halves, made of 1½ inches by ¾ inch wood. Screw these on the table tightly around the mould. The object of this frame is to enable the case to be refixed in the same position subsequently.

Now remove the frame, taking care not to get the halves mixed, open the case and take away the clay padding. Thoroughly clean the insides of the cases making certain that the air holes made by the clay pips are clean and go right through the casing. Shellac the cases well and wipe out with a soft rag damped with paraffin.

C: Having inspected the model and retouched with shellac if necessary, brush a very little paraffin over this as well, and check up that it rests in its correct place on the table in the pencilled outline. Now re-screw the rear half frame back in position and put the rear case in place against it. Then fit the front case in place, making sure that the keyways synchronise.

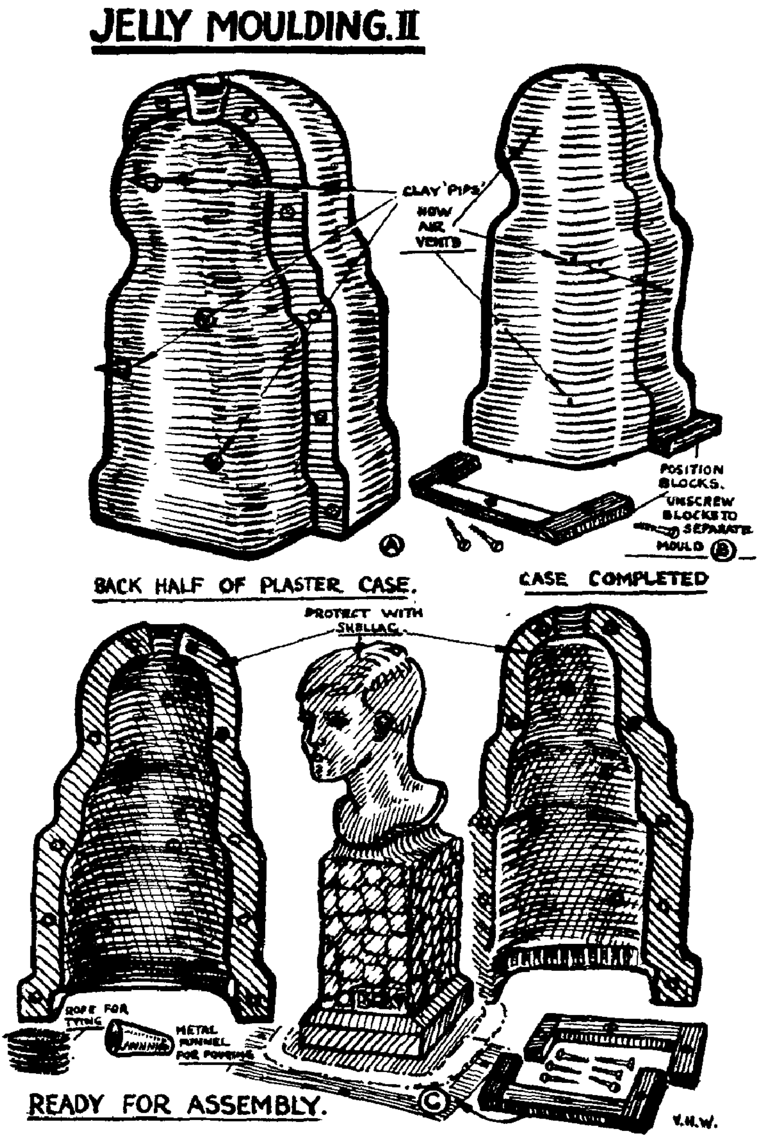

JELLY MOULDING. II
CLAY 'PIPS' NOW AIR VENTS
POSITION BLOCKS.
UNSCREW BLOCKS TO SEPARATE MOULD
A
BACK HALF OF PLASTER CASE.
B
CASE COMPLETED
PROTECT WITH SHELLAC.
ROPE FOR TYING
METAL FUNNEL FOR POURING
C
READY FOR ASSEMBLY.
V.H.W.

PLATE 29

PLATE 30.

Screw down the front half frame to the table, in its original position against the front case. Now tie the cases together bringing the ends of the rope down to nails in the sides of the frame. This is to hold the mould down when pouring, as the jelly would lift the whole lot up. It is therefore important to see that the frame is strongly screwed to the table, and that the rope ends are pulled tight. Now push wedges in the ropes to further tighten them, making sure you do not cover up any of the air holes that were made by the conical pips shown on plate 28. These serve as guides to the progress of the jelly.

Put a wide funnel in the hole left by the plug in the top of the head, get a lump of soft clay ready.

See that the jelly is at a comfortable heat for the finger, and pour it slowly into the funnel. The skin on top of the jelly in the pot, hangs as a screen and keeps the heat in and should not therefore be taken off. Make two holes at either side of the skin to allow the jelly to run freely.

You should now have assistance to plug up the air holes.

Keep on pouring steadily watching the lowest air hole. It will bubble and simmer at first, and then a steady stream of jelly will flow out. Now is the time to press a blob of clay over the hole. On no account must it be stopped before this steady stream runs, or you will trap air in the jelly. As you steadily pour, the jelly mounts in the case, and each hole must be checked and, when running freely, stopped with clay. When the case is finally full, fill the funnel to the top to allow for settling. Keep a watch for a few minutes in case of subsidence. Should the level of the jelly drop suddenly, you will find that possibly one of the air hole stops has come away, and this must be replaced and more jelly added to replace the loss.

When finally satisfied that the jelly is setting correctly, remove the funnel and trim jelly level with the top of the case. Allow to set overnight at least, untie and remove the front case and the frame. The jelly will show as a complete cover or blanket over the bust. Now cut the jelly in two with a jelly knife, cutting it level with the edge of the back case. The jelly knife leaves a keyway or channel as it cuts.

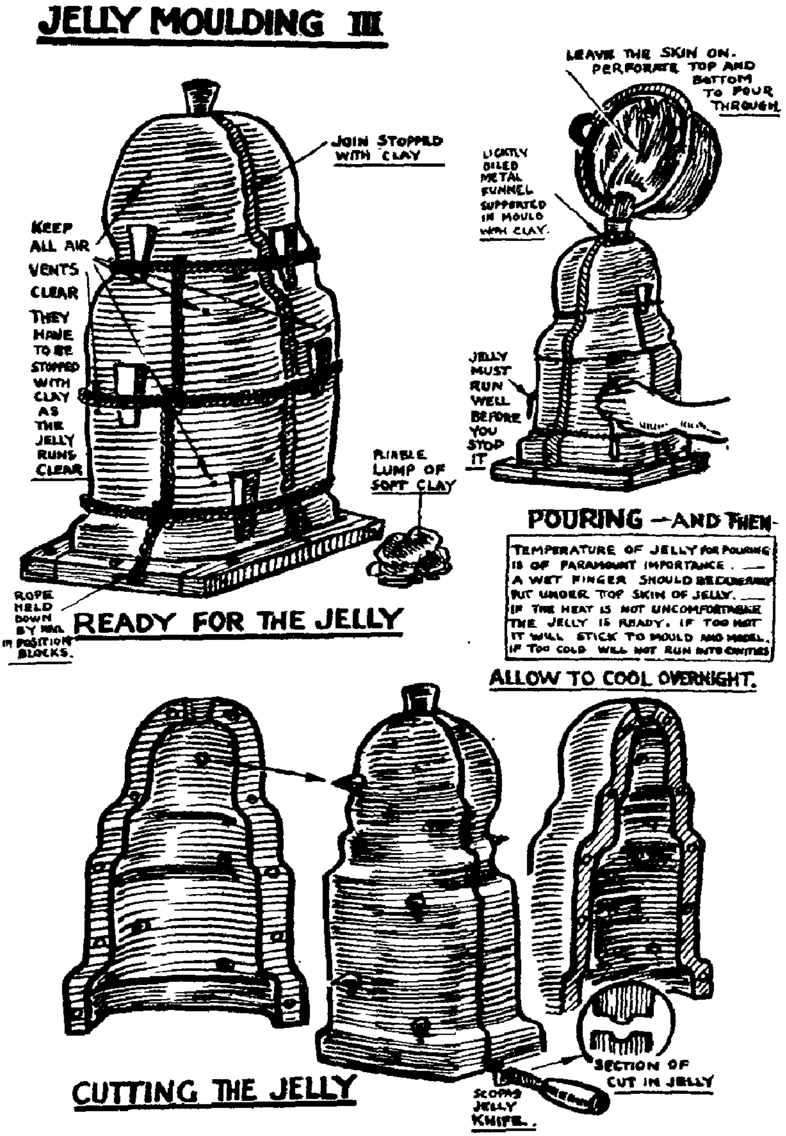

JELLY MOULDING III
LEAVE THE SKIN ON. PERFORATE TOP AND BOTTOM TO POUR THROUGH
JOIN STOPPED WITH CLAY
LIGHTLY OILED METAL FUNNEL SUPPORTED IN MOULD WITH CLAY.
KEEP ALL AIR VENTS CLEAR
THEY HAVE TO BE STOPPED WITH CLAY AS THE JELLY RUNS CLEAR
JELLY MUST RUN WELL BEFORE YOU STOP IT
LUMP OF SOFT CLAY
ROPE HELD DOWN BY NAIL IN POSITION BLOCKS.
READY FOR THE JELLY
POURING —AND THEN-
TEMPERATURE OF JELLY FOR POURING IS OF PARAMOUNT IMPORTANCE. —
A WET FINGER SHOULD BE CAREFULLY PUT UNDER TOP SKIN OF JELLY. —
IF THE HEAT IS NOT UNCOMFORTABLE THE JELLY IS READY. IF TOO HOT IT WILL STICK TO MOULD AND MODEL. IF TOO COLD WILL NOT RUN INTO CAVITIES
ALLOW TO COOL OVERNIGHT.
SECTION OF CUT IN JELLY
JELLY KNIFE.
CUTTING THE JELLY

PLATE 30

PLATE 31.

Having separated the front section of the jelly, dust both this and the front case with French chalk, and put the jelly into the case. Always do this, never leave the jellies out of their cases.

Now remove the rear case and jelly dusting each with French chalk too.

Having inspected the jellies to see that there are no air holes, brush them out with a solution of alum water (5 per cent. alum to volume of water). Do edges as well. Now wipe the surfaces and edges with a very little paraffin. A few drops in the palm of the hand will be ample for a life size bust. Apply with a clean soft brush. Now tie the jellies and case together tightly, seeing that the jelly keyway and the plaster case keyways all synchronise, and pour in a rich creamy mixture of plaster. Run the plaster round and round by turning the mould in all positions from the vertical to the horizontal, etc., as described on page 34. Back up inside with small squares of plaster soaked scrim. In practice small pieces of scrim are easier and quicker to apply than large ones. Most jelly moulds will remain workable for quite a number of casts, but watch that the reproductions remain clear and clean. As the jelly deteriorates, so the amount of cleaning up of the plaster casts, increases until the point is reached where it is advisable to repour the jelly.

Where a large section of the model is plain with no undercut parts, such as the back of the present model, this can be cast from a plaster mould without using jelly. In other words it is possible to cast this bust with a plaster mould for the back and a jelly and plaster case for the front, thus saving jelly. Proceed by building a fence in usual position, and make the solid plaster back mould first. Remember to make the fence high enough to make a thick edge to this rear mould as the edge must correspond in thickness with the combined thickness of the front jelly and casing. When the back mould has set, take away the fence and cut two sets of keyways in the edge—one for the jelly and one for its case. Now cover the front of the model with a smooth pad of clay ¾ inch thick, rising to 1 inch thick at the edges. This, as explained before, gives strength to the edge of the jelly where handling occurs. Put four or five conical clay pips on the pad, for the air holes, soap and oil the edge of the back mould and proceed to pour the front case. When it has set, remove it and shellac the inside well, wipe out with a paraffin rag, take away the clay pad, treat the edges, tie up and pour the jelly, following the procedure described before.

JELLY MOULDING IV
BRUSH OVER WITH WEAK ALUM WATER THEN SPARINGLY WITH PARAFIN.
BACK AND FRONT JELLY AND CASE READY FOR TYING AND PLASTER
CLEAN OFF FLASH AND TOUCH UP
PLASTER CASTING
WHEN PLASTER IS QUITE SET UNTIE MOULD. LAY ON BACK AND TAKE OFF FRONT CASE. LAY THIS READY TO RECEIVE FRONT HALF OF JELLY.
CAREFULLY LIFT JELLY OFF CAST, AND DUST WITH FRENCH CHALK. IT IS THRILLING WORK WATCHING THE STOCK OF CASTS GROW.
J.H.W.

PLATE 31.

Making the Jelly Mould in Two Pourings.

The second method of making a jelly mould for the bust, consists of pouring the jelly in two. First shellac the model, then cover it with a ¾ inch thick smooth pad of clay rising to an 1 inch thick where the edges will be. Put on a few clay pips over the pad. Erect a fence around the model as usual, adding a round plug of clay at the top of the head. This will leave a hole through which you will pour the jelly. Proceed with making a 2 inch thick plaster case of the back. When it has set, remove the fence leaving the top round plug of clay in position, and cut keyways in the edge. Soap and oil this edge, and proceed to making the front case. When set, take away the front case and the round plug on top, being careful not to move the back case. Cut away the front part of the clay pad level with the edge of the rear case, and make keyways in the edge of the clay pad remaining. Now shellac two coats, and oil this clay edge and the edge and inside of the front case seeing first that the clay pips have left clear clean holes right through the case. Wipe a paraffin rag over the shellac surface of the front half of the bust, put the front case back in place, and tie up tightly. Proceed with pouring the jelly as before. Watch the air holes and only stop them up when the jelly is running clear. When full let it set and then take off the back case and the remainder of the clay pad. Shellac and oil the edge of the front case and brush the front jelly with alum water then oil this too. Now wipe a paraffin rag over the shellac of the back part of the bust, put the back case on, tie up and proceed to pour the jelly through the hole in the top left by the round plug of clay.

Follow process previously described and cut top jelly level with case when finished with the funnel. Remember that this second pouring must be rather cool or it will otherwise melt the edge of the front jelly. Now dust both cases with French chalk, put the jellies into them, and brush the jellies with alum water and wipe them out with a paraffin rag, doing edges as well. Tie up and proceed to pour the plaster as before.

Piece Mould.

As the name implies, piece moulds are made up of a number of small pieces of mould. These are fitted together and a casing is built around them. The resulting completed mould will give a large number of casts and, even more important, will keep indefinitely. This is a great advantage over the jelly mould which deteriorates in a few weeks and has to be repoured.

The size of each piece is regulated by the amount of undercut parts on the model. When there is any doubt as to a piece drawing off easily, it is better to make it in two rather than run the risk of breakage of the mould or cast.

PLATE 32.

Plan the layout of all the pieces first with a faint pencil line, sketching each piece in outline on the model. Figure out the angle of the sides and edges so that the pieces will not fall inwards when assembled in the casing. Joggles and keyways are necessary on all sides, and the entire mould is built up piece by piece until the final or locking piece is reached. This holds all the pieces of the mould together and should have a small loop of wire inserted in its back to use as a handle to allow its removal, as this piece is the first off.

When starting on the plaster pieces on a vertical model (lay it down whenever possible) begin at the bottom and construct a fence along the faint pencil outline. Usually no reinforcement is needed in these small plaster pieces provided you make them thick enough to stand handling. If reinforcement is necessary, use perforated zinc sheeting for medium size pieces and scrim for larger pieces.

When the model is in clay or soft modelling material, it will be found quicker to use metal fences instead of clay ones. Cut suitable lengths of the brass or tin sheeting and insert in the clay deep enough to allow them to stand firmly. If care is exercised, very little damage is done to the model. When pouring one of the pieces, cover all the nearby clay with soft damp paper to protect it from splashes of plaster.

Apply the plaster for the first piece and when set, remove it, trim the edges, cut joggles or keyways to suit, and pare a good ¼ inch champher off the outside edges. When the case is being poured, the ridges made by these " grooves " act as keyways to lock the pieces in place.

Give the piece a good coating of shellac, oil slightly and return it to its place on the model. Tap it lightly but firmly into place as if there is a slight space between the piece and the model, plaster will seep through when pouring the next piece and cause trouble.

Proceed with the next piece, working progressively along the plotted lines, until the last piece is to be cast. This is the locking piece, and the slope of its edges should taper outwards towards the back. When casting the case, the little wire handle in its back (mentioned above) should be covered with clay to avoid it from sticking in the casing.

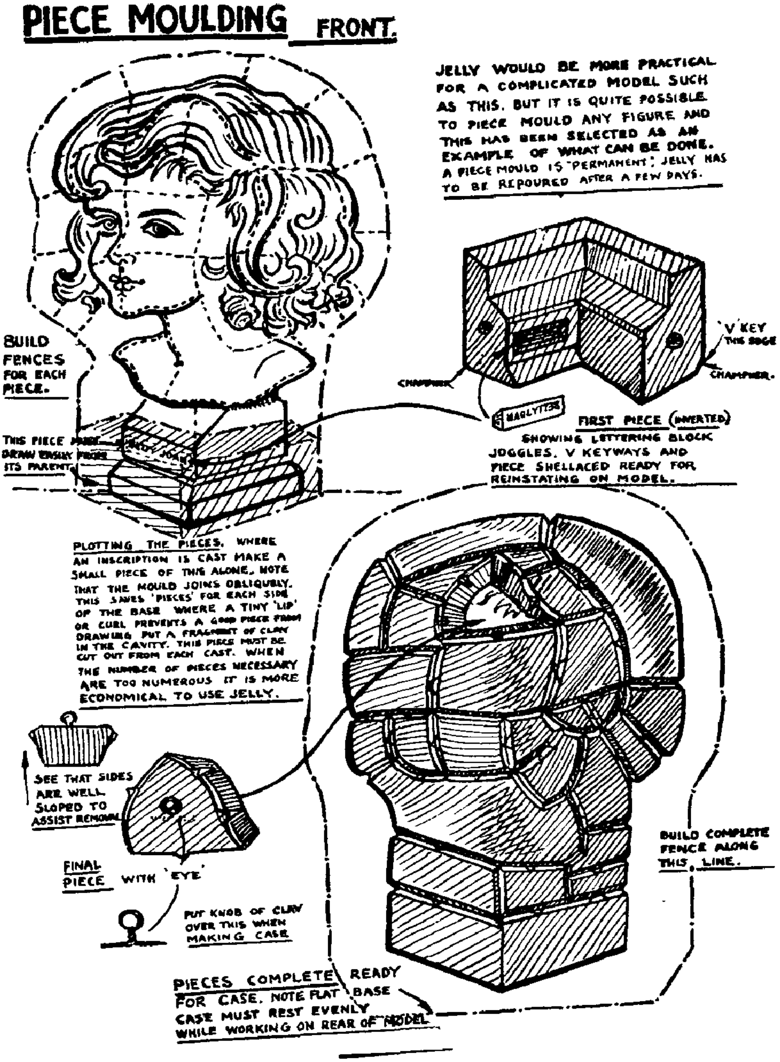

PIECE MOULDING FRONT.
JELLY WOULD BE MORE PRACTICAL FOR A COMPLICATED MODEL SUCH AS THIS, BUT IT IS QUITE POSSIBLE TO PIECE MOULD ANY FIGURE AND THIS HAS BEEN SELECTED AS AN EXAMPLE OF WHAT CAN BE DONE. A PIECE MOULD IS "PERMANENT", JELLY HAS TO BE REPOURED AFTER A FEW DAYS.
BUILD FENCES FOR EACH PIECE.
CHAMFER.
V KEY THIS EDGE
CHAMFER.
FIRST PIECE (INVERTED)
SHOWING LETTERING BLOCK JOGGLES, V KEYWAYS AND PIECE SHELLACED READY FOR REINSTATING ON MODEL.
PLOTTING THE PIECES. WHERE AN INSCRIPTION IS CAST MAKE A SMALL PIECE OF THIS ALONE. NOTE THAT THE MOULD JOINS OBLIQUELY. THIS SAVES 'PIECES' FOR EACH SIDE OF THE BASE. WHERE A TINY 'LIP' OR CURL PREVENTS A GOOD PIECE FROM DRAWING PUT A FRAGMENT OF CLAY IN THE CAVITY. THIS PIECE MUST BE CUT OUT FROM EACH CAST. WHEN THE NUMBER OF PIECES NECESSARY ARE TOO NUMEROUS IT IS MORE ECONOMICAL TO USE JELLY.
SEE THAT SIDES ARE WELL SLOPED TO ASSIST REMOVAL
FINAL PIECE WITH 'EYE'
PUT KNOB OF CLAY OVER THIS WHEN MAKING CASE
BUILD COMPLETE FENCE ALONG THIS LINE.
PIECES COMPLETE READY FOR CASE. NOTE FLAT BASE CASE MUST REST EVENLY WHILE WORKING ON REAR OF MODEL

PLATE 32.

PLATE 33.

When the pieces have all been made, put on the case, well reinforced with irons and scrim for a large mould (scrim only for a small one). Make a front and back case. If the model is being moulded in a recumbent position (by far the best method of working) a top and bottom case will be necessary. The top case is put on when the top half pieces are completed, and the entire model and pieces and casing are turned over and the bottom pieces and casing are proceeded with. Don't forget to cut plenty of joggles and keyways in the edge of the top case and treat it before pouring the bottom one.

It is sometimes convenient and quick to cast some of the pieces with the case. This occurs when there is a large plain section without any undercut parts. This is left till all the other pieces of that side of the model have been completed, and then the plain piece and case is poured in one.

Once the mould and case have been completed, remove the case and take the pieces from the model in the reverse order of their making, putting them in their place in the case.

It will be found useful, should you have pieces approximately of the same shape, to number these on the back, and put a corresponding number in the case where they fit. This is not necessary when a few irregularly shaped pieces comprise the mould, as their shape immediately declares their positions. Wherever there is a doubt of a piece of the mould falling in when the case is turned over, an eye or small loop must be inserted in its back. These eyes are made of wire bent round a small rod, and the ends widened out to hold in the plaster. Put clay over these eyes when moulding the case, and when this has set, take it off and drill a hole through it at the cavity left by the clay. The eye can be seen through this hole from the outside. Stout string can then be drawn through the eye and out through the drilled hole, when it can be tied to a piece of wood and wedged tight against the case.

Piece moulding is a highly specialised job and should not be attempted by a beginner without the assistance of an experienced teacher.

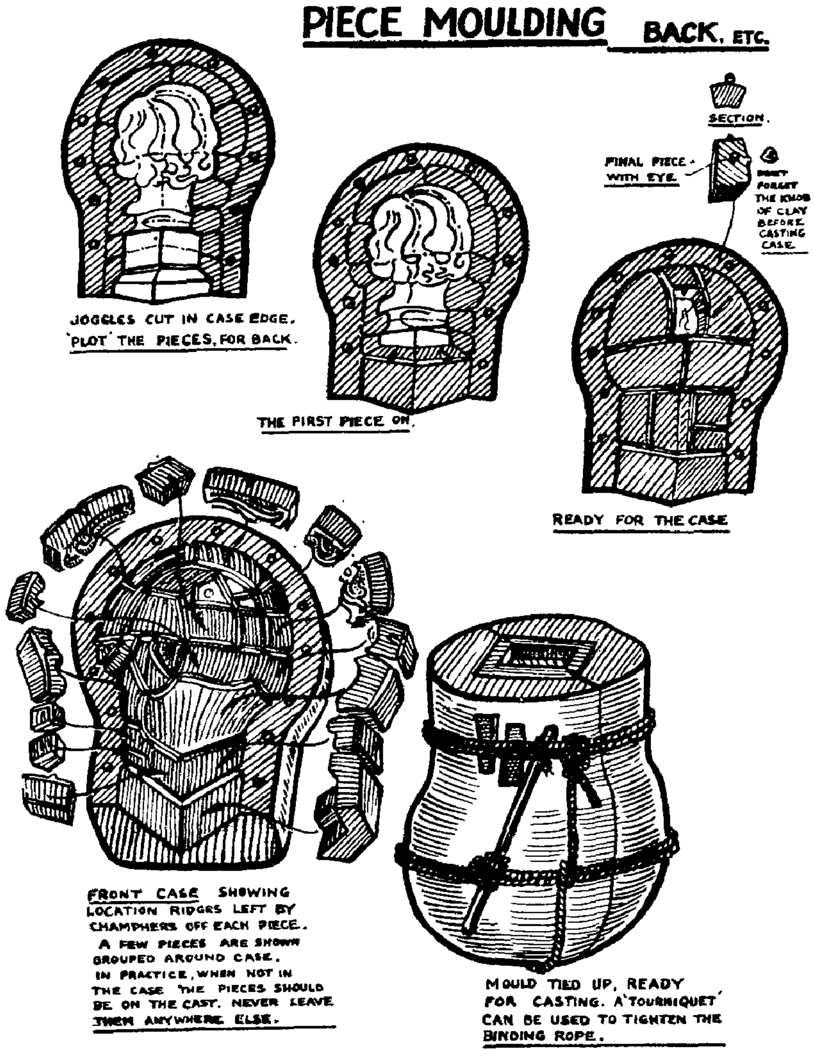

PIECE MOULDING BACK, ETC.
SECTION.
FINAL PIECE - WITH EYE.
FORGET THE KNOB OF CLAY BEFORE CASTING CASE.
JOGGLES CUT IN CASE EDGE. 'PLOT' THE PIECES, FOR BACK.
THE FIRST PIECE ON.
READY FOR THE CASE
FRONT CASE SHOWING LOCATION RIDGES LEFT BY CHAMPHERS OFF EACH PIECE. A FEW PIECES ARE SHOWN GROUPED AROUND CASE. IN PRACTICE, WHEN NOT IN THE CASE THE PIECES SHOULD BE ON THE CAST. NEVER LEAVE THEM ANYWHERE ELSE.
MOULD TIED UP, READY FOR CASTING. A 'TOURNIQUET' CAN BE USED TO TIGHTEN THE BINDING ROPE.

PLATE 33.

Moulding a Cast in Several Pieces and Joining Up, and making a Hollow Cast of a Large Model.

With a large model where it is not convenient to cast in one piece, or where a strong thin hollow cast is required, it will be necessary to make the casting in several pieces, joining these together subsequently.

It may be convenient to merely make two pieces—one for the back and one for the front.

Prepare your mould in the usual way, and proceed to put on the plaster —a wide brush will be found to apply it evenly. When the coat is thick enough, back it up with some plaster soaked scrim, pressing it carefully into the plaster. Put reinforcing irons or battens if necessary. Build the cast ¼ inch out beyond the edge of the mould. When completed, proceed in the same way with the second mould, and when both back and front casts are completed, trim them carefully flush with the edge of their moulds. Now place them together and join them on the inside with long strips of plaster soaked scrim. If the bottom opening is too small to allow reaching up to the top, the rear cast will have to be made in sections. Cast each section separately and join to the front cast, beginning with the top section. Sometimes a long stick will reach a difficult corner, but for strong work it is desirable to join by hand. Short strips of scrim should be wiped on at right angles across the join and, if necessary, short pieces of plaster soaked batten (wet well before plastering) will add strength. Place at right angles across the join as with the scrim.

When casting a figure of heroic size, cast large sections separately, and then join them together as above, care being taken however to reinforce the joins for the weight they will eventually take and not just for the joins of the sections. Saturated scrim strips, battens, or irons should be taken across the join well into each section sometimes right across two or three sections.

Moulding a Cast from Life.

Moulds from the living are not particularly difficult, though they may cause some unpleasantness for the model. Try doing a hand for a beginning.

Casting a hand from life: Grease the hand thoroughly making sure all the hair is flattened down, then place in the desired position on the table, supporting it with a lump of clay to prevent muscular fatigue. In all cases of moulding from life, the model must keep absolutely still while the plaster is applied. Construct a fence round the hand and make countersunk keyways in it. Gauge some plaster in warm coloured water (warmed to minimise shock to the model, coloured to distinguish the mould subsequently, from the cast) and pour on. Do not worry much about the " drawing " of the mould as the flesh will give, within reason, to the set plaster. When the plaster has set, lift the entire hand and mould, and turn over. Clean off fence and clay lump, and brush the edge of the top mould with clay-water. Grease the hand as before, gauge fresh plaster and complete the mould. No reinforcing irons are necessary as long as the plaster is put on thick enough to stand the strain of separation. About two inches thick for the hand will be quite strong. Gauge the plaster rather thicker than usual so that once the skin is covered, no time is lost in setting. When complete the model can separate the mould by bending his wrist. Examine the mould for air bubbles and proceed to oil it, assemble, etc. and cast. Remember to put irons in the fingers and thumb before closing the mould. (See plate 26 for the fixing of irons in casts.) After several attempts with hand (and foot) the face may be attempted.

Casting a face from life: There are two main methods of doing this. Pouring the mould in one, or dividing the face down the middle and making the mould in two sections. I am describing both here, but suggest the latter should be first attempted as it is more pleasant and safe. Lay the model down and close ears with cotton wool. To make the mould in two, build a fence down the centre of the face, from the middle of the forehead down the centre of the nose, chin, neck. This method leaves one nostril and part of the mouth open for breathing which gives the model more confidence. Grease the half of the face you are doing first, covering eyebrows, hair, moustache, etc., with thick pomade, clay or wax. Tie a stiff cloth round the head and neck close to the back of the ears. This will act as a fence. Gauge a basin of plaster with warm coloured water, and another with strong alum water, so that it will set quicker than the first. Make careful tests to know how long each takes to set. Pour the warm coloured plaster over the face and immediately this has firmed, apply the alum gauge and as soon as this has just set, gently but firmly remove the mould. The object of the two gauges of plaster is to protect the hairy portions of the face from injury, as the first coat takes longer to set than the second one, though still held in place by it. Thus the surface next the skin, is soft enough to allow the hairs to draw clear when taking the mould off. Now remove fence, and cut keyways in the edge of the mould, and clay-water it. Put mould back in place making a hole through the nostril for the model to breath. Proceed with making the other side of the face in the same way.

To mould the face in one, lay the model down as before, close the ears with cotton wool, grease the face, eyebrows, hair, etc. Now fix two long quills into the nostrils with fine wool, for breathing purposes, and close the eyes. Tie the stiff cloth round the head and neck close to the back of the ears and proceed to pour two gauges of plaster as before, and as soon as the top gauge has just set, gently but firmly remove the entire mould and quills. It is advisable when moulding the face to have an assistant. This gives more confidence to the model and is necessary should any accident occur.

A death mask is carried out in the same way except that only one gauge of plaster is necessary, no quills are needed, and the eyes can be left open. This is not a pleasant task, but necessary in cases of important persons.

To mould a complete head from life, allow the front mould to set hard, clear holes through the nostrils for the model to breath, cut keyways in the edges and brush well with clay-water. Now place the mould face upwards and the model can re-insert his face therein. Remember to rest the mould on two battens so that the air can get to the two holes of the nostrils. Proceed with pomading or greasing the hair and with the two gauges of plaster.

It is now possible to get special preparations for casting from life which, although expensive, are very quick and safe to use, and last indefinitely.

Cleaning Plaster Casts.

A dirty cast can be easily cleaned if the correct procedure be adopted. Mere dust can be flicked off, but when of old standing, the cast will have to be washed. Do not under any circumstances wash it as you would wash a dish. This will send the dirt in. The only way is to totally immerse the cast, leaving it untouched until it can absorb no further water.

When the bubbles cease to rise, leave for another ten minutes or so and then wipe it, UNDER THE WATER, with a sponge. Do not lift the model above the surface as it will collect again the dirt that is floating there.

When thoroughly sponged, collect all the dirt from the water with blotting paper and a saucer, or allow the tap to run until all the dirt has flowed away over the sides. Only when the surface of the water is clean, can the cast be removed.

If the sponge is used before the cast is sufficiently saturated, the wiping will send the dirt in, so try wiping on an unimportant part first.

Bronzing and Colouring Plaster.

After the warm appearance of the clay of the model, the white of the plaster is very unsatisfactory, and above all, soils very easily unless treated in some way.

Numerous methods have been devised to colour and treat plaster and surprisingly beautiful results can be obtained. A few are mentioned here and the student is advised to experiment for himself, working on the lines indicated.

Make sure the cast is dry before commencing.

CLOSING THE PORES: The first and essential step towards colouring is the closing of the pores of the plaster. Nothing should be attempted until this is done, as it will be hopeless. The following are a few ways of doing this.

White Shellac: the Simplest of all.

Dissolve an ounce of white shellac (not brown) in a pint of methylated spirit, and keep in a bottle to avoid evaporation. Can be bought ready prepared in bottle.

Brush on to cast, and keep covered while drying or dust will collect.

Should you desire to finish off at this stage and leave the cast white, polish up with cotton wool.

Dextrine: A cheap and satisfactory way, when colouring up. Bought in powder, dextrine dissolves easily in water. An ounce of powder makes a pint of solution.

Make a vat and dip the casts in, or brush on with one way strokes. Ideal for multiple casts, it has the advantage of hardening the surface of the plaster, but turns it slightly yellow.

Size: Use good quality clear size and brush on until the plaster will absorb no more.

White Beeswax and Glycerine: Cut up two ounces of best white beeswax in a jar with half pint of glycerine, and place in a saucepan of water. Heat until the wax has melted, then thin as desired with turpentine. Be careful of the spirit near the fire. Apply with brush while hot and, when thoroughly dry, polish with French chalk and cotton wool.

Milk wash: Take clean skimmed milk, making sure that no particule of cream remains, and coat the cast (immerse if possible) until it will absorb no more. Gently blow off supurflous milk and place in a dust free cupboard till dry. When polished with French chalk and cotton wool, it will have the appearance of marble. A similar effect can be gained by gauging your plaster with equal quantities of skimmed milk and water. Here again no cream whatever must be left in the milk.

Linseed Oil: Two coats of clean linseed oil, brushed on, will suffice. To get an old ivory finish, keep a week over a smoky fire and then polish up.

Stearine and Pearl Ash: Take two parts of stearine, two parts of Venetian soap and one part of pearl ash. Grate the stearine and soap and mix with thirty parts of solution of caustic soda. Boil for half an hour, stirring well all the time. Add the pearl ash dissolved in a little rain water, and boil for another five minutes. Stir till cold and mix with more caustic soda until it is liquid.

Allow to stand for seven days well covered up. This preparation will keep indefinitely provided it is kept bottled and corked. Brush on until the plaster can hold no more and polish when dry, with a piece of silk material till you get a magnificent polish. If not satisfied, give another coat and polish as before.

Litharge and Linseed Oil: For protecting external plasterwork, boil six parts of linseed oil, one part of litharge and one part of wax. Brush on hot and when dry, give a second coat. Allow to dry and then polish.

Wax and Turpentine: Stearine or Paraffin wax dissolved in turpentine (1 ounce to half a pint) makes an excellent waxed surface on a dry plaster cast. Should any part get clogged with too much wax, hold near a fire until it runs clear and can be wiped away. When a dull polish appears, it has absorbed sufficient wax. Polish briskly with a pad of cotton wool, when dry. A little yellow ochre, raw umber or black, applied sparingly just before the final polish, will give an old ivory effect. Rub colours well into hollows and wipe off high spots. A final polish with French chalk will give a good lustre.

French Chalk: An excellent final polishing agent for almost any finishes. Use with a pad of cotton wool.

It can also be used by itself on a nearly dry cast. Dust well with the chalk and polish up with the wool, taking care it does not cake. It should not if the cast is dry enough. For deep parts apply with a camel hair brush.

BRONZING AND COLOURING: First see that the pores of the plaster are closed as explained above (shellac, size, dextrine, etc.).

You will need powder colours, burnt umber, emerald green, a little lamp black, reds and blues, and a *medium for floating these on.* Use *Gold* size (thinned with turpentine and linseed oil) or shellac.

(Oil colours can be used in place of powder colours. Thin with turpentine. If used too thick they will clog the modelling.)

You will also need the metal powders, bronzes, golds, copper, etc. The medium here should be cellulose lacquer or shellac.

To bronze a cast, select the shade you require, raw or burnt umber, or green, and mix a little in a saucer with gold size. Float on to the cast as quickly as possible taking care not to disturb the first coat (put on to close the pores). Should you lift any of the latter, do not attempt to repair until the surrounding portions are dry. When the colour coat is hard, mix a little of the bronze powder with the cellulose lacquer and apply to such parts of the surface as your taste dictates. The projecting parts only will need bronzing. The hollows and shadows left *coloured* add *greatly to the effect* of real bronze. Experiment also with the red and gold bronze powders and the red and blue colours. You will soon get accustomed to their possibilities. The emerald green will provide the patinae of old bronze. Study old bronze casts and you will be astonished at the variety of colours on them.

Having completed the bronzing to your satisfaction, you must now wax it for protection. Use *stearine or white* paraffin wax dissolved as described above. If, when applied to the model, no polish can be obtained, the mixture is too weak and more wax must be added. If too much wax is used, it will clog the crevices and spoil the bronzing. Apply hot with a large soft brush. Leave the cast for a day and then polish with cotton wool. The wax fixes the bronzing and should any alterations be made, bronze as before and re-wax.

An alternative method of bronzing is to apply the bronze coat before the colour coat (umbers, green, etc.). In this case the colours will be applied mainly to the hollows, leaving the bronze coat showing through in the projections and high parts by shading the colour off with cotton wool. This method is more pleasing than the other, but expensive as more bronze powder is used.

VARNISH: An extraordinary beautiful varnish may be made by fusing half an ounce of tin and half an ounce of bismuth in a crucible. Melt together and then add half an ounce of mercury. When fusion is complete, allow to cool and add the white of an egg. The varnish must be brushed on, making sure the cast is dry and free from stains or dust before applying. The varnish will dry polished.

GENERAL NOTE: Bronzed or coloured casts, when chipped, show white, and to avoid this somewhat, the cast can be coloured before closing the pores. Use a wood stain of the same colour as the top coat and brush on. This stain goes right into the plaster and should the subsequent top coats get chipped, it will not show up white.

A polished finish is obtained by mixing the powder colours with gold size. For a matt finish mix with methylated instead of the gold size.

Papier Mache, by Eric Hart.

The term PAPIER MACHE, in its original sense, denotes "made of pulped paper." The making requires strong metal moulds with slightly smaller positives, the wet pulped-up paper being squeezed between them with considerable pressure and allowed to dry there. This gives perfect results, but is rather expensive owing to the cost of the metal moulds. Pulped paper, if not cast with pressure moulds, gives a very lumpy and uneven surface. Nowadays, however, the term PAPIER MACHE includes the process of making paper articles by pasting a number of coats of paper on top of each other until the required thickness or strength is attained. This method is cheap, the ordinary plaster moulds being used. It is of value to the sculptor who wishes to make a few papier maches from his plaster mould, and especially useful where the mould is a waste mould which will be destroyed after making the plaster cast, as a few papier maches can be made from the mould before pouring the plaster in. These copies, incidentally, can be used for trying out experiments in colours, etc., to see how the work might look, experiments which cannot be tried out on the single plaster cast. I am describing here the making of this type of papier mache cast.

TOOLS.

The only tools required are a good hogs-hair brush (No. 8 or 9, spade or oval shaped oil painters), a small modelling tool, a fairly large pasting board of thick glass or ebonite, and four or five small sacks loosely filled with sand, on which to rest and adjust the mould in any desired position.

MATERIALS.

Paste: Having tried various adhesives, including home made flour and starch pastes, and a combination of these with gum, glue, size, etc., and prepared adhesives, I have found nothing to come up to ordinary paper-hangers paste. A cupful of this, made by stirring a couple of tablespoons into half a cup of water, with a pinch of salicylic acid as a preservative, is enough for a life size mask. It is best to have the paste slightly on the thick side, but this is a matter for individual experiment. Note that the paste should be stirred into the water and not vice versa.

Papers, etc.: Ordinary smooth (not crinkly) toilet paper is ideal for the first foundation coats. Ordinary tissue paper is not nearly so strong as toilet paper, and the best quality of the latter is advised. Back up with ordinary newspaper and lastly sugar papers of two different colours, blue and grey. These latter are similar to those used by your grocer to wrap up sugar. Blotting paper and book muslin, in place of newspaper and sugar papers, also give excellent results. Sugar paper has the advantage of not crinkling or shrinking very little as it dries (a virtue shared by the blotting paper) and of being very strong and extraordinary pliable. Book muslin, often seen in cheap papier mache masks, is excellent in many ways, but shrinks slightly in drying. For obtaining results *outside* a mould, it should be splendid. Cloths *should* be excellent for the purpose, for unlike paper, they shrink when wet and stretch when dry, but in practice they are poor.

PREPARING THE MOULD.

The mould must be treated to prevent the paper sticking to it. Prepare a solution of beeswax and turpentine, placing them in a jam jar and heating this in a saucepan of water until the wax has melted. The high inflammability of turpentine should be remembered and guarded against. When the mould is thoroughly dry warm it, and brush in a creamy solution of the beeswax until the plaster can absorb no more. Care should now be taken that no surplus wax remains. Careful heating in front of the fire will soften superflous wax when it can be wiped off. When dry, give a rub over with an oil rag. Another method of treating the mould is to give it two or three coats of shellac and then a final rub over with an oily rag as before. Use paraffin or olive oil, but apply sparingly for if too much oil is allowed to remain on the surface of the mould, it will prevent the first coat of paper from taking the plaster properly.

MAKING A PAPIER MACHE MASK.

The toilet paper should be torn up, *not* cut, into two or three different sizes (about 1 inch by ½ inch, 1 inch by 1 inch, 1 inch by 2 inch). Now rest the mould in a comfortable working position on the sacks of sand, and, with the paste brush, pick up a piece of the paper and jab it well into the mould. It is best to complete the whole of a small area at a time, say 4 inches by 4 inches, while it is wet, so continue to paste in pieces of the toilet paper covering the area decided upon, until there is a depth of three coats completed. Remember to carry the paper a good half inch above the edge of the mould whether it is to be trimmed off or turned down, as this edge will give a grip by which to pull the cast out of the mould.

You will have to depend upon the colour of the paper to know when you have finished the thickness required. Now proceed in the same way, to paste in two coats of ordinary newspaper, tearing this in small pieces as before. When completed, proceed with the final backing of three coats of sugar paper. This should be torn up into rather larger pieces than the toilet paper. About a dozen of them should be placed upon the pasting glass and pasted thoroughly, rubbing in well with brush or finger. This rubbing in is essential. They should be well rubbed into the mould over the other coats. Use a modelling tool to follow the modelling where the finger or brush cannot reach. Keep on pasting until you have the three coats completed, the different colours serving to tell how the work is progressing. Keep each coat a little way back from the coat under it; these margins ensuring good joins when the adjoining areas are pasted in. Now proceed with an adjoining part of the mould. Apply the three coats of toilet paper, two coats of newspaper, and three coats of sugar paper joining up with the first section on that side, but leaving margins of the other sides as before. Continue doing section by section until the whole mould is completed, when the mask and mould should be put away in a fairly warm place to dry. Quick drying is to be avoided as it causes uneven shrinkage. Rest the mould with the edges uppermost so that the mask remains face downwards, and to test if dry, lift the mask out by gripping the margin sticking out of the mould, and feel the tip of the nose—the lowest point. When dry the mask is ready for the next stage of the work.

It seems impossible to get a perfect surface in papier mache, so after the mask has been taken out of the mould, it will require a certain amount of treatment. The first thing to do is to paste down the little corners of toilet paper which will be seen sticking up here and there on the face. Then it will be noted that there are a few small hollows and crevices. These are best treated with plaster made up with size, a mixture which does not set for several hours, but will be found to adhere very strongly to the paper surface, and takes sand-paper well subsequently. Gesso can be used if preferred.

It will be found an advantage to strengthen the edge of the mask, and for this, paste in two strips of sugar paper, 1 inch wide, all round the inside edge, and then fold down and over this band the margin of toilet paper sticking up. Alternatively, the margin can be trimmed off with a razor blade. For masks which are to be hung up, use a couple of brass or bone rings with pieces of tape passed through them. Paste the ends into position on top of the first sugar-paper coat, the subsequent coats being pasted down over these. If the masks are to be worn, elastic is fastened to the rings, but if they are to be hung up, pieces of stiff wire, bent to a triangle, are hooked on to the rings. String or picture wire would tend to draw the sides of the mask together, whereas the stiff wire will not.

Since the surface of the paper cast is of paper and paste, it should be obvious that any finishing must be done with a paint or stain having an oil basis, as a water basis would destroy the surface. Use ordinary oil colours, thinned if necessary with turpentine (not oil) for the skin. Enamel paints are used for the hair, eyes, teeth, lips. Another method is to shellac and then proceed to bronze or colour in the same way as a plaster cast as described on pages . The inside surface of the mask should be brushed with shellac, varnish or paint.

MAKING A PAPIER MACHE BUST.

This entails the same procedure as that used in making a mask, but a cast is made of the back of the head as well, and the two are joined together subsequently. Having made the two casts, add strengthening strips of sugar paper round the inside edges, but do not turn down the margin of paper sticking up. When dry, trim this margin off carefully, level with the edges of the moulds. Now get some ordinary builder's lathes (1 inch by ¼ inch) and cut up a number of pieces 3 inches long. Fix these at one end inside the edge of the back cast with thick plaster gauged with size, leaving the other end sticking out clear of the cast. The lathes should be fixed at a maximum distance of ¼ inch from each other, all round the edge. When they have firmly set, gauge up some more thick plaster with size, and plaster up the uncovered ends of the lathes and push the front cast or mask over them. A certain amount of plaster will squeeze out of the join and this, when trimmed off and sandpapered down, will effectively conceal the join. Another and quicker method is to place the two casts together and wipe strips of plaster soaked scrim across the joins.

For theatricals, where accuracy is not essential, it will be found possible to make good masks without having recourse to a mould. Get the plaster model and give it a good coating of shellac or beeswax solution, and proceed to paste the papers over it. It is naturally important that you follow the modelling with care to make sure that as much of it as possible will show through the paper thickness.

For the experimental mind, it will be found interesting to try pouring "papier mache." As mentioned at the beginning of this chapter pulped paper, if not cast with pressure moulds, will dry lumpy and uneven. Try using asbestos powder, or pumice powder (it is possible to get these as fine as Italian plaster of Paris). Both these materials will give excellent casts almost as light as the paper. Back up with scrim soaked in the material you are using.